THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXIX. No. 720.] LONDON, FEBRUARY 27, 1877. [29TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—12,000 cubic feet of gas per ton of coal: 28-candle gas; coke, 66·70 per cent.; volatile matters, 33·30 per cent. Coke of good quality.

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GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.

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GENUINE TORBAY PAINT
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FOUR PRIZE MEDALS. ESTABLISHED OVER 20 YEARS.

These Paints are now used in 150 Country Gas-Works, and by all the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.

They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.

The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.

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CONTRACTOR FOR
LAYING MAINS & ERECTING APPARATUS.
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JOSEPH COWEN and CO.,
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J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.

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16, SOHO SQUARE, W.;
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J. R. & Co., Ld., make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.

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AND OF THE DUPLICATE COPY
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AND MANUFACTURERS OF
IMPROVED DRY GAS-METERS
Warranted to Measure correctly & not to vary.
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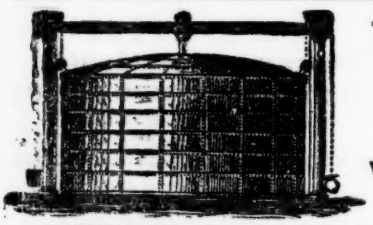
Now ready, GAS CHANDELIER BOOK (Reduced Prices), 7s. 6d.



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REFERENCES TO UPWARDS OF 300 GAS-WORKS.

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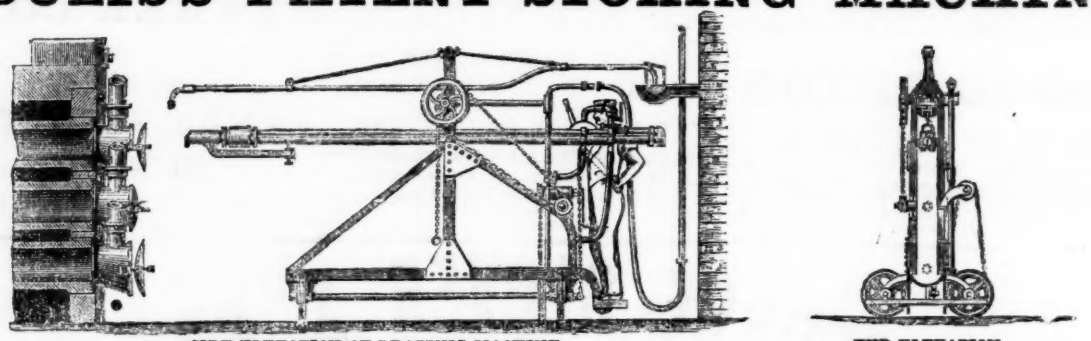
FOULIS'S PATENT STOKING MACHINE.



SIDE ELEVATION OF DRAWING MACHINE. END ELEVATION.

(The Charging Machine will be Illustrated in next week's Advertisement.)

Makers: TANGYE BROTHERS and HOLMAN, London and Birmingham; ADAM WOODWARD and SON, Manchester; ROBERT LAIDLAW and SON, Glasgow; MASCHINENBAU-ACTIEN-GESELLSCHAFT HUMBOLDT, Kalk bei Deutz; Or all particulars may be had from JAMES WOTHERSPOON, 31, St. Vincent Place, Glasgow.

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WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

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SPECIAL NOTICE.—Our Patent Machine-made Retorts have now been in *actual work* nearly 800 days, and are yet in good order. References on application.

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GAS PURIFICATION & CHEMICAL Co., LIMITED,

(Successors to JOHN WILLIAM O'NEILL & CO.,)

Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

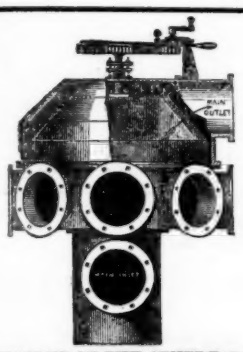
CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

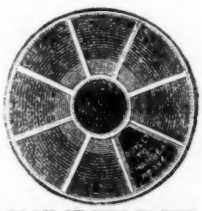
JOHN WILLIAM O'NEILL, SAMUEL H. JOHNSON, } Joint Managing Directors.

C. & W. WALKERS'

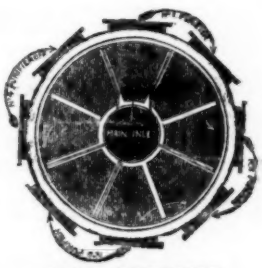
PATENT CENTRE-VALVES.



ELEVATION OF THE CENTRE-VALVE.



PLAN OF THE VALVE.



PLAN OF THE BODY.

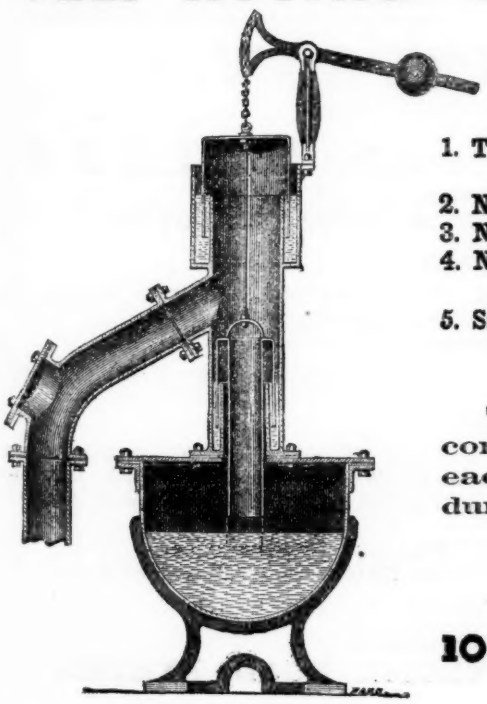
These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

MIDLAND IRON-WORKS. DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



ADVANTAGES.

1. There is no pressure on the Retorts.
2. No deposit of Carbon.
3. No scurfing is required.
4. Never a choked Ascension-Pipe.
5. Saves Fuel and Wear and Tear.
6. Gets 10 per cent. more Gas out of the Coal, and a higher Illuminating Power.
7. Is never out of order.
8. Requires no attention.
9. Is perfectly automatic in its action.

These Dip-Pipes can now be supplied complete, except the flanched bend, for £4 each, which includes the charge for licence during the whole term of the patent.

Applications to be made to

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Who fix the Dip-Pipes, at a small Charge, when required.

THE

IMPERIAL METER COMPANY,

LIMITED,

KING'S ROAD, LONDON, N.W.,

OFFICE: 115, VICTORIA STREET, WESTMINSTER, S.W.,

MANUFACTURERS OF

"WET" & "DRY" GAS-METERS IN IRON & TIN-PLATE CASES,

STATION-METERS AND GOVERNORS, STREET-LAMP METERS, BOXES, AND REGULATORS FOR THE AVERAGE METER SYSTEM.

Attention is called to their Dry Meters in Wood Cases, as used by the principal London Gas Companies. These Meters are especially suitable for seaport towns and for export.

The Company repair or convert every description of Wet Gas-Meters to De Castro and Burton's Patent.

EDWARD E. CROMBIE & CO.,

INVENTORS AND PATENTEES

OF THE

FRICTIONLESS DRY GAS-METERS,

Beg to intimate to Gas Companies and others that they are now prepared to supply these very superior Meters at the same prices as for the ordinary Gas-Meters.

In the construction of this Meter, for which the best tin plates only are used, every mechanical contrivance has been taken advantage of successfully to reduce the friction to a minimum, which is amply proved by the fact that they are made to work upon only one-fortieth of an inch pressure. By an improvement also in their construction, a steadier light is obtained, and greater capacity than can be got from any other Meter in the market. No gas can pass under the valves on any back pressure, as is the case with many other Dry Meters.

To Gas Companies supplying gas through streets with heavy gradients, these Meters are invaluable, as much gas is saved from the low pressure required to work them.

ALL METERS ARE UPHELD FOR FIVE YEARS.

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IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

GOVERNORS, PRESSURE AND EXHAUST REGISTERS, TEST HOLDERS.

And all kinds of Experimental Gas Apparatus.

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WORKS: COMMERCIAL ROAD, EXETER,

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NEW GAS-WORKS erected complete. Plans and Estimates furnished. MAINS, METERS, SERVICES, LAMPS, &c., adapted for Towns of any size. Gas Companies advised on Improvements, Extensions, and Alterations of Works.

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They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

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An extensive variety of Choice Designs in CHANDELIERS, PENDANTS, BRACKETS, STAR and SUN LIGHTS, MEDIÆVAL FITTINGS for CHURCHES, &c.

PATTERN-BOOKS and PRICE LISTS furnished.

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(ESTABLISHED 1827,)

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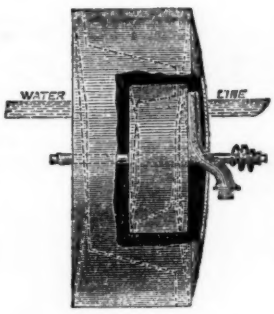
FENNEL STREET, MANCHESTER.

BUCCLEUCH ST. WORKS, EDINBURGH.

From "THE JOURNAL OF GAS LIGHTING," Jan. 5, 1875.

"The changes effected in the construction of the wet meter are such that it now occupies a position which it never held before—that of an unvarying measure. . . . Both company and consumer are now equally protected, perfect accuracy of measurement is obtained, and that, too, without the least increase of mechanism, or the action of the meter in the least degree being prejudicially affected."



BRITISH ASSOCIATION of GAS MANAGERS, Leeds, 1875.

Inaugural Address of the President, JAMES PATERSON, Esq., F.G.S., of Warrington.

"There are, however, degrees of what may properly be termed excellence; and this leads me to notice one of the most beautiful applications which science has yet devised in the construction of the meter, and which has rendered it an absolutely reliable and unvarying instrument. . . . The object aimed at, and most admirably accomplished, is to change the varying measurement of a varying water-line to an unvarying measure with a varying water-line and annulus."

WARNER & COWAN'S PATENT

"SELF-REGULATING DRUM" GAS-METER.

It is the ONLY Meter in which reliance can be placed.

It is the ONLY Meter in which the DRUM or WHEEL has been improved since it left the hands of Clegg and Crosley.

It is the ONLY Meter that POSSESSES AN UNVARYING MEASURING-CHAMBER.

It is the ONLY Meter FREE FROM delicate and complex compensating arrangements for maintaining water-line.

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(ESTABLISHED 1827,)

CHURCH STREET, MILLBANK STREET, LONDON, S.W.

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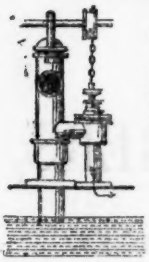
W. & B. COWAN'S large and increasing Export Trade is provided for by their keeping constantly on hand a very large stock of both Wet and Dry Meters, ready for immediate despatch to the British Colonies and Foreign Countries.

COPP'S PATENT ANTI-DIP GAS APPARATUS.



Produces from 10 to 20 per cent. more gas of higher illuminating power.
Prevents the deposit of carbon.
Retorts last much longer.
Charges work off quicker.
This simple invention has been in use in many works for the last six months, with the above results.

PRICE 2 GUINEAS EACH.

Testimonials and particulars on application.

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WOOD SIEVES,
WITH TAPER BARS,
MADE BY MACHINERY
CAPABLE OF MAKING 10,000 FEET WEEKLY.
References to Hundreds of First-Class Engineers.
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MANUFACTURERS OF
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FOR ENGINEERS,
STEEL OF ALL DESCRIPTIONS,
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MANUFACTURERS OF
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QUARLS, GAS-RETORTS,
SANITARY PIPES, CHEMICAL PIPES, &c.
All made of the best quality of Fire-Clay, wrought from Whickham Colliery.

J. S. & Sons having during the past year erected large Works at Derwenthaugh, in addition to their old Works at Gateshead-on-Tyne, are in a position to supply large orders with the greatest despatch.

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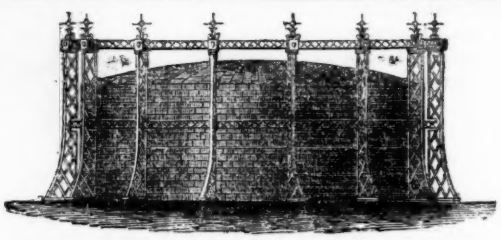
PRESSURE AND EXHAUST REGISTERS,
LAMP-METERS IN CAST-IRON BOXES,
And every Description of Gas Apparatus.



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AND ALL REQUISITES FOR EITHER
GAS OR WATER WORKS;
ALSO
MAKERS OF ROOFS, BRIDGES, &c.

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DISTRICT OFFICE: 97, NEW STREET, BIRMINGHAM; AGENT: W. M'GOWAN;
Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.
N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

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MANUFACTURERS OF
IMPROVED CENTRE-VALVES,
PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,
And every description of Gas Machinery.
TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.

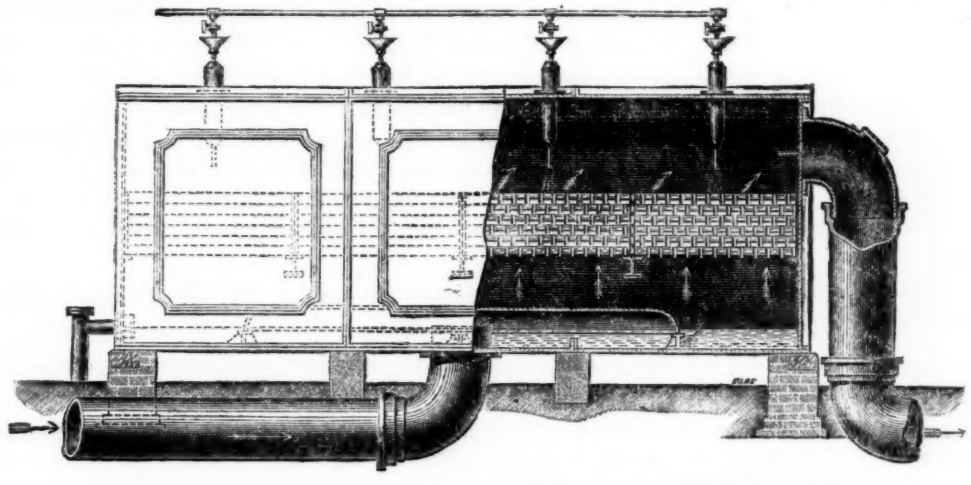
GAS PURIFICATION.

SAVILLE'S

SELF-DISTRIBUTING GAS SCRUBBER-WASHER.

PATENTED IN

GREAT BRITAIN, FRANCE, BELGIUM, PRUSSIA, AUSTRIA, & UNITED STATES.



MECHANICAL ARRANGEMENT.

The Washer Tank contains a large bottom chamber, into which the Gas is freely admitted through an ordinary full-way inlet-pipe, passing first under an inverted vessel which removes any Tar remaining in the Gas after leaving the Condenser; it then rises slowly over the whole surface, CONTAINING AN AREA OF ABOUT EIGHT TIMES THAT OF THE INLET-PIPE, through equidistant spaces in a series of Self-Sealing Water Troughs, arranged in tiers, dividing itself and passing through the various dips until it reaches the upper chamber, and from thence through the outlet-main.

The washing liquid being CLEAN WATER is admitted by the Syphon inlets on top of Tank to the upper row of troughs, running through each successive tier, and becoming impregnated with the impurities extracted from the Gas, gaining strength at each dip on its descent, and finally passing off by the outlet syphon at the bottom.

It will be observed that in this Scrubber-Washer the Gas comes first in contact with THE STRONGEST LIQUOR at the bottom, and passes through WEAKER LIQUOR at each successive tier, until it issues through CLEAN WATER into the upper chamber; hence the true principle of Gas Purification by Washing is simply and automatically effected.

ADVANTAGES.

Great economy in first cost and foundations.
Great saving of other purifying apparatus and material.
Occupies little space, and stands only a few feet in height.
Being entirely self-acting, requires no motive power either for purifying or distributing.
The Gas is washed several times in ONE vessel, each time in liquor of a different strength, ultimately passing through CLEAN WATER.
Produces liquor of any required strength by once passing through.
Can be fixed (if desired) at any elevation to permit Contractors' tanks being filled without the expense of pumping.

One of these Scrubber-Washers has been in successful operation for the past twelve months at the Sowerby Bridge Gas-Works, and they are now being erected at the Corporation Gas-Works, Adderley Street, Birmingham, and at the Phœnix Gas-Works, Vauxhall, London.

Prices and full Particulars on application to

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Sole Manufacturers,

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THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

TO GAS ENGINEERS AND MANAGERS.

It having come to our knowledge that a report is in circulation, spread by some unprincipled person or persons, that the cases of our larger-sized Meters are made of Galvanized Iron, we think it only fair to ourselves, and just to our customers, to say, that we never have used, in making any of our Meters, a single pound of *Galvanized Iron*, or any other *cheap* and *inferior material*, and this can be easily seen by opening any of them.

The cases of our large-sized Meters, from 20 lights and upwards, are all made of the very *Best Best Patent Alloy*, which is nearly double the price, and will last more than double the time, of some other material that has been and still is very largely used for the same purpose. And our experience, acquired by an extensive use of it for upwards of 30 years, enables us to say with confidence that no other metal in use for the purpose is so little liable to corrosion from the action of the gas.

We have now in use a Meter made in 1848, and therefore 29 years old, the case of which is made of Patent Alloy; the Meter is still in perfect order, and shows no signs of decay.

The utmost care is exercised by us in selecting none but the very best materials for all parts of our Meters; much of it is made *expressly for us*, as it is not possible to obtain it in the open market of the same superior quality.

The great fall in the price of all materials used in making our Meters has enabled us to give an increased discount, thus giving our customers the benefit of the fall. This we were bound in fairness to do, as we raised the price of our Meters four years ago, when the price of all metals went up.

It will be our constant endeavour, by using none but the best materials, and employing the most skilful workmen, to maintain the high character our Meter has hitherto borne.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

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WET & DRY GAS-METERS,

STATION-METERS WITH PLANED JOINTS,

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AND EXPERIMENTAL APPARATUS,

STREET-LAMP METERS,

AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

H. E. SADLER, New Haven, Conn.—*The report of lecture on "The Volumetric Determination of Sulphur and Ammonia in Illuminating Gas, with a Description of the Apparatus Employed," is to hand, and we hope to find space for it at an early date. The numbers of* JOURNAL *required have been forwarded.*

JNO. CHEW, Blackpool.—*Your note on "Internal Gas-Fittings" next week.*

Reports and accounts of the Brighton, South Shields, Reading, Wakefield, Redhill, Kirkby-Lonsdale, Sutton-in-Ashfield Gas, Sunderland, Rochester and Chatham, Leicester, South Staffordshire, Newcastle and Gateshead Water, Chesterfield Water and Gas, and other companies, are to hand, but their publication is unavoidably postponed.

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, FEBRUARY 27, 1877.

Circular to Gas Companies.

THE development and progress of gas industry is well shown in the Bills annually presented to Parliament. This year it will be seen that, in all, thirty-six measures having connexion with gas matters, will be introduced. Of these, twenty-two are promoted by Gas Companies, either for incorporation with statutory powers, or to obtain additional powers. The share capital it is proposed to raise under the authority of these Bills, amounts to no less a sum than £1,184,910, and the sum to be raised by way of loan is £381,150. The measures promoted by Local Authorities will sanction the borrowing of money for gas purposes to the amount of £1,268,000, and beyond this there are three Bills by which Local Authorities seek power to raise as much money as may be required to effect their object. Of course, all these measures will not pass, for some are antagonistic; but those which, after consideration, we deem safe to become law, will add, at least, two and a half millions to the amount already invested in gas undertakings. This sum, it must be borne in mind, is required for extensions and additions, and, therefore, represents progress, and, looked at in that light, it is significant of much. It means, of course, national progress, as well as the development of the gas industry.

Of the Bills not certain to pass, we may instance that of the Corporation of Hanley, who propose to raise £150,000 for gas purposes. The mention in the Bill of a specific sum to be paid as a consideration for the undertaking of the British Gas Company, led us to suppose that an arrangement had been come to by the Corporation and the Company. This, however, we learn, is not the case, and the Bill will be resisted to the last extremity. Now that we know that terms have not been settled, we may say that the price proposed by the Corporation of Hanley is altogether inadequate. The undertaking supplies a constantly improving district, and its value increases every year. It seems, then, absurd to suppose that the Directors of the British Company would part with it on the terms offered by the Hanley Corporation. We have yet to ascertain the temper and disposition of the Committees who will this year sit to consider Gas Bills. It is useless, however, to attempt to disguise the fact that there is an increasing disposition on the part of Parliamentary Committees to favour the transference of Gas and Water Undertakings from Companies to Local Authorities. Regret it as we may—and from more than one point of view we regard it as a serious evil—there is no use in closing our eyes to a patent fact. The British Company, we are certain, will make a good fight. There is nothing to be alleged against them. Their gas supply in the Potteries district is good and cheap, and the district would not be in the least degree benefited if this undertaking passed into the hands of the Corporation of Hanley.

The reports of the half-yearly meetings of Gas Companies, which we print to-day, reveal a highly satisfactory state of affairs. The Liverpool United Company are, of course, prosperous, and able to pay full dividends, carrying, we have no doubt, although no accounts are given this half year, a good sum to the reserve-fund. It is with great satisfaction that we publish the resolution of the Directors, to pay, in the future, interest on money deposited as security. Considering the large sum the Company hold, it has been regarded as a sort of scandal, that, while most other undertakings in the kingdom are required by law to pay interest, none was obtainable from the Liverpool Company. The concession now made by the Directors will remove a source of great irritation, and although it may not satisfy Dr. Cross, it will go a long way to make the great body of consumers contented. It will be remembered that, long before the Gas-Works Clauses Act of 1871 was passed, we advocated a more general exaction of deposits, and the payment of interest. We did so on the ground that it made the consumer a sort of co-partner in the concern. A deposit with a Gas Company at five per cent. is better than one in a savings bank at three per cent. We should be glad to see more opportunities given to consumers of all grades to contribute to the loan capital of Gas Companies. If such were offered, we think it might, at the expense of a little extra book-keeping, be doing something towards counteracting the prevailing passion for transferring gas undertakings to local authorities.

The report of the meeting of the Ipswich Gas Company will be perused with a great deal of interest. It will be seen that a shareholder considered it a grievance that the Directors refused to sell the undertaking to the Corporation of Ipswich for guaranteed maximum dividends, and that the same gentleman subsequently defeated the Directors in their proposal to offer a new issue of shares by auction, on the ground that it would deprive him of the premiums realizable on the shares which would be allotted to him. We fail to understand this gentleman. He is either a philosopher and a patriot, or something else. If the undertaking were sold to the Corporation, his right to new shares and his chance of obtaining premiums would vanish for ever. The sale of shares in the Ipswich Company, we may remark, is not compulsory, and if the Directors had carried their resolution, we think that any shareholder might have successfully moved the Court of Chancery to restrain the Directors from selling shares by auction. We are not now arguing against auction clauses, which we may say, however, are not so much in favour as Mr. Goddard supposes. There is but one Gas Bill before Parliament this year which makes mention of an auction, and that will only give Directors permission to offer shares in that way when they have been declined by existing shareholders. In the case of the Reading Gas Company, the sale of new shares by auction is compulsory, and it is gratifying to see that shares so offered command increasing premiums. Frankly speaking, we do not like auction clauses, for they deprive shareholders of a vested right which Parliament has, in past times, conferred on them. Nevertheless, the success of these sales may be quoted as a strong argument in favour of keeping gas undertakings in the hands of commercial companies. Local Authorities go to the Bank of England, or to an Insurance Office, and raise large sums at from three-and-a-half to four per cent. Somebody, of course, gets the benefit of the interest. But these sales of shares by auction show that small investors are

content with almost as low a rate, for the prices given can hardly, at the best, command more than five per cent. The difference is but small. Opposed as we are to the sale of gas undertakings to Local Authorities, we wish to see Companies constituted on the widest possible basis. Earl Redesdale, we have always considered, did a great wrong to small investors, when he refused to allow shares of less nominal value than ten pounds. A real Consumers Company is now out of the question; but something, we think, might be done to popularize Gas Companies, if debenture bonds for small amounts were offered to consumers.

There was, as our readers will remember, some objection made to the payment of back dividends by the Wakefield Gas Company. The point raised, however, was easily disposed of, and at the half-yearly meeting on the 19th instant, together with the maximum dividends, another of nine-and-a-half per cent. was declared on account of arrears, all free of income-tax. The shareholders may be heartily congratulated.

The Redhill Gas Company, also, while paying full dividends for the past half year, make the small contribution of one per cent. towards the discharge of arrears. They do more and better. They reduce the price of gas from 5s. 6d. to 5s. per 1000 feet.

The circumstances of the Barnet District Company continue to improve. The accounts to be submitted to the meeting held to-day show an increased gas rental of £329 over the corresponding half year of 1875. The dividends proposed are four-and-a-half per cent. on the A shares and stock, and three-and-a-half on the B stock, leaving a small balance to be carried forward.

Equal in interest to the coming parliamentary contest between the British Gas Company and the Corporation of Hanley will be that between the Isle of Thanet Gas Company and the Ramsgate Local Board. The Bills promoted by the two authorities are unmistakeably measures of confiscation, and will be resisted, as we have said, to the last extremity. Margate, as every one must know, is as much interested in the Bill of the Thanet Gas Company as Ramsgate, yet at a special meeting of the Town Council of Margate, convened to consider the propriety of opposing the Bill of the Gas Company, the necessary majority in the Council could not be found to sanction the preliminary stages of opposition. The Bill of the Company was severely criticized, and the proposal to capitalize the £48,000 of expended profits was, of course, condemned by those who would adopt precisely the same course. Nothing can be more just and equitable than the capitalization of expended profits at a low rate of interest. The gas consumers in Margate and Ramsgate have gained considerably by what we regard as the mistaken policy of the Company in not going to Parliament years ago for power to raise further capital. It is acknowledged in Margate that the Gas Company have dealt fairly with the town. Objection is made to the maximum price of 5s. 6d. per 1000 feet proposed by the Company; but, as we have said before, this price may be altered in committee. A resolution to oppose the Bill of the Ramsgate Local Board in a "friendly" way was carried by an absolute majority in the Council; whether or not the ratepayers of Margate will understand what is meant by "friendly" opposition, remains to be seen.

The gas accounts of the Corporation of Birmingham, which we print in another place, are certain to attract attention. Corporation management of commercial undertakings is always closely watched, and sometimes severely criticized. In this case, however, it is clear that the management is all that could be desired. The accounts are rendered in much the same form as that prescribed by the Board of Trade for the Metropolitan Gas Companies, and which has been adopted by the Corporation of Nottingham. We miss, however, the account which ought to show the quantity of gas made, sold, used at works, and unaccounted for. It will be seen, however, that the quantity of gas sold in the past year was just about eight thousand cubic feet per ton of coal carbonized or used, which, seeing that only a small amount of cannel was employed, and that the gas had an average illuminating power of over seventeen candles, must be accepted as a very good result. It will be well in future accounts to fill up this *hiatus*.

The discussion in the Council on the presentation of the Committee's report is of much interest to us. We are sorry that the gas consumer has not more friends in the Council, but we may fairly anticipate that, before many years have passed, some change of opinion may take place among the members.

It will, we fear, be found in Birmingham that, notwithstanding the possession of the gas undertaking, and the appropriation of profits to the Borough Fund, rates will continue to increase in amount, and presently the consumer will ask for cheap gas as a relief. The £30,000, which the Council have just transferred to the Fund, is equal, we are told, to a rate of 7½d. in the pound; and this is paid by only half the ratepayers, who may be roughly said to be rated to double that amount. We were quite prepared to see reproduced the old argument, that as the ratepayer is responsible for any losses, he is justly entitled to any profits. There is a certain speciousness about this argument which makes it popular. The Borough Fund is, of course, pledged for the Annuities. But let us suppose for a moment that the gas undertaking failed to meet its liabilities with gas at the maximum price—what would happen? Why, the Corporation would immediately apply to Parliament for an advanced maximum, which would certainly be granted, and thus the consumer would, practically, be made responsible for the solvency of the concern.

We are not surprised to see that the small amount appropriated to the reserve-fund has provoked comment. It was the first duty of the Gas Committee to add to this fund as largely as they possibly could. It is a fund of equal importance to the ratepayer and consumer, but the latter alone contributes to it. It is a guarantee against any call upon the rates, on account of loss by accident, &c., and for that reason should, as soon as possible, be made up to an amount sufficient to provide for all contingencies. We hope the time will soon come when sounder economic principles will be entertained in the Birmingham Town Council.

At the half-yearly meeting of the Cork Consumers Gas Company a dividend of eight per cent. was declared. The reserve-fund of this Company now amounts to £7000—a sum by no means too large; but some of the shareholders are wishful that a portion of this modest amount should be distributed by way of bonus, or as payment for arrears of dividend during the period of the coal famine. The Directors, we think very properly, for the present at all events, decline to accede to this request; but hopes are held out that if the present prosperous condition of the Company is maintained, a bonus may hereafter be paid.

We learn that the Corporation of Wigan have appointed two most competent engineers to make an investigation of the matters in dispute between the Corporation and some of the gas consumers, to which we recently referred. These are Mr. Littlewood, of the Manchester Gas-Works, and Mr. T. Newbigging, whose name is well known to our readers. We shall wait with interest for the result of their inquiries, which, we understand, will be commenced this week.

Water and Sanitary Notes.

We give, to-day, a list of the Water Bills presented to Parliament this session. It will be seen that they number twenty-three, of which fourteen are promoted by Companies, and nine by Local Authorities. The aggregate amount of share capital which the Bills promoted by Companies propose to raise is £1,001,000, with borrowing power to the extent of £254,750. The sum which Local Authorities propose to raise for water purposes is no less than £1,685,000. Here again, however, we have to remark that all these measures cannot pass. There are, for example, three newly-formed Companies who compete for the supply of one district. Of the three Bills promoted by them, it is clear that only one can become law. Again, there are other antagonistic measures proposed, like those of the Ramsgate Water Company and the Ramsgate Local Board; but, after a review of all the circumstances, we come to the conclusion that at the end of the session it will be found that authority has been granted for the expenditure of about two and a half millions on water undertakings. The larger proportion of this sum—probably one and a half millions—will be expended by Local Authorities, whose debt will be augmented to that extent. This, however, need not create alarm, for water undertakings always pay, if they are not very profitable.

The Metropolitan Board of Works are once more greatly exercised on the Water Supply of the Metropolis. They have waited, they seem to say, for years to see effected that complete municipal organization of London, which would constitute a body who might be safely entrusted with the management of the water supply; but as this has been so long delayed, and is likely to be still further postponed, the Board present themselves as the Metropolitan Authority proper to take the matter in hand. They are about to prepare a Bill to effect a compulsory purchase of the London Water Companies, and when they have done this, they propose to go to the Government and ask their aid in the enterprise. They first sought the co-operation of the Corporation of London; but that wary body stand aloof. They do not care about hunting in couples. Perhaps one reason for the present move is the fact that the Duke of Richmond, now in the Cabinet, was, in 1869, the Chairman of the Royal Commission who inquired into the Water Supply of the Metropolis, and recommended, in rather emphatic terms, that the supply should be managed by a compact responsible public body, and not by several private Companies.

(We may drop the remark, in passing, that it has often struck us as odd that the idea of amalgamating never seems to have occurred to the Water Companies.) Granting, for the moment, the desirability of carrying out the recommendation of the Royal Commission of 1869, we may ask whether the Metropolitan Board, as at present constituted, is a body fit to be entrusted with the management of the water supply. We say, emphatically, "No;" and we think we may safely predict that they will evasively be told as much, at that coming interview with the Home Secretary. We are not now arguing either for or against the broad proposition put by the Royal Commissioners. We are simply speaking of the chances of the present Metropolitan Board. Since the Board have waited so long for a municipal organization, they might have waited another year, to learn the result of Earl Camperdown's well-intentioned effort to bring about a reform in the constitution of their body—a reform which, if effected, may produce a Board worthy of public confidence, which Vestry delegates will never command. Let the Board take our advice, and petition in favour of Lord Camperdown's Bill before they take any further action on the water question.

We shall not notice at any length the debate—perhaps as vapid as any ever heard in Spring Gardens—but of which we, nevertheless, give a full report. It will be sufficient to notice the reasons given for the proposed action of the Board. First, it is alleged that it is necessary to make the supply secure. Now, the supply furnished by the Companies has never failed, except in one small district soon to be effectually provided for. Then it is urged that a constant and copious supply is necessary. Well, as regards the latter, the Companies distribute about thirty gallons per head of population per day, and if that is not a copious supply, we should like to know what would be. That the whole Metropolis has not to-day a constant supply, is simply owing to the obstructiveness of the Metropolitan Board, who, if they should get the undertakings into their hands, will make regulations much more stringent than those proposed by the Water Companies. Lastly, the Board profess a desire to cheapen the cost of water to the consumer. They propose a lower domestic rate, but would seek power to levy a public rate, the two together amounting to just about the same rate as is now levied by the Companies, who supply the water used in extinguishing fires for nothing. It will be seen that the Board were not quite unanimous in adopting the hasty proposal of the committee, and that the opposition was of a rather influential character.

Very little was said about the quality of the water at present supplied; but one innocent speaker did announce his belief that the metropolitan public would not much longer endure the existing supply, and suggested that if the Companies are purchased, the estimated cost of bringing water from other sources should be deducted from the purchase-money. The Royal Commission of 1869, it will be remembered, reported strongly in favour of the present sources of supply, which may, and must, soon be supplemented, but, in our opinion, will never be superseded. On this question of quality, we print, to-day, a report made by Dr. Tidy to the Society of Medical Officers of Health. He is a young man, but he is in as good a position to form an opinion on the matter as one much older. The plain fact is, that, if only the one-hundredth part of what is alleged against Metropolitan Water was true, London would long since have become a waste, howling wilderness, instead of being, as it is, the healthiest large city in the world.

WATER BILLS FOR 1877.

The following Bills are to incorporate Water Companies, and confer the usual statutory powers.

The *Bristol District Water Bill* is promoted by a new Company, who seek to compete with the existing Bristol Water-Works Company. The share capital proposed is £200,000, carrying the usual borrowing power. The Bill, of course, will be strongly opposed, and probably we shall not be far wrong in prophesying that it will be rejected.

The *Bromsgrove, Droitwich, and Redditch Water Bill* is to incorporate a new Company, formed for the supply of the places named, and adjacent localities. The capital proposed is £60,000, with the usual borrowing power. The supply of water is to be obtained by impounding springs and streams on lands described. The water-rate proposed is six per cent. on annual rack-rent, or gross rateable value, with the usual extra charges for baths and closets; or, if the supply be by meter, 1s. 6d. per 1000 for the first 50,000 gallons, and beyond this 1s. for the same quantity. There are no unusual provisions in the Bill.

The *Carnforth District Water-Works Bill* is to incorporate a newly formed Company, with powers to supply the district named. The share capital proposed is £15,000, with the usual borrowing power. The water is to be obtained by impounding springs and streams on lands described. The rates and extra charges proprosed are about as usual. Power is sought to make regulations for the prevention of waste, and also to deal in fittings, and do plumbers work.

The *East Worcestershire Water Bill* is to incorporate a rival Company to the last but one mentioned above. The districts which this Company propose to supply are practically the same as those named in the Bromsgrove, &c., Bill. If the East Worcestershire scheme should be carried, the supply of water will be derived from wells to be sunk in the parish of Bromsgrove. The rival companies ask for the same rates and extra charges. The Bill now under notice proposes a share capital of £80,000, carrying borrowing powers to the extent of £19,500.

The *North-East Worcestershire Bill* is promoted by a third Company seeking power to supply water within the same limits. In this case, a capital of £80,000 is proposed, with the usual borrowing power. The source of the water is apparently the same as that proposed in the last-mentioned Bill; the rates are also the same, and the general provisions of the three measures closely resemble each other.

The *Sevenoaks and West Kent Water Bill* is to incorporate a company with power to supply water to Sevenoaks, and a considerable district in Kent. The source of the water is to be a well in the parish of Sevenoaks. The capital proposed is £100,000, carrying the usual borrowing power. The water-rates mentioned are rather high, being eight per cent. on annual rack-rent or gross rateable value, with the usual extras, and no house or cottage will be supplied for less than threepence per week.

The *Sunningdale District Water Bill* is to incorporate a Company with power to supply water within rather extensive limits, comprised in the counties of Berks, Middlesex, and Surrey. The source of the water is to be a well or wells in the parish of Windlesham (Surrey). The capital proposed is £100,000, with the usual borrowing power. The rate mentioned in the Bill is seven-and-a-half per cent. on gross annual rent, with the usual extra charges, and no house will be supplied for less than twopence per week.

It is hardly necessary to say that in all these Bills, provisions are inserted conferring the usual statutory powers.

The next group we notice are Bills promoted by Companies already possessing statutory, to obtain further, powers.

The *Falmouth Water-Works Bill* is to enable the Falmouth Water-Works Company to raise additional capital to the amount of £15,000, and to borrow to the usual extent, for the purpose of acquiring land and constructing additional works. Beyond this the Bill seeks only some ordinary powers.

The *Heywood Water Bill* is to empower the Heywood Water Company to raise £50,000 additional capital, and borrow to the usual extent, for the purpose of constructing new works. The main provisions of the Bill simply relate to compensation water, and are only of local interest.

The *Kent Water-Works Bill* is to extend the limits of supply of the Kent Water-Works Company, and to empower them to raise additional capital to the amount of £160,000, carrying the usual borrowing power. New works are proposed in the shape of a well or wells in the parish of Beckenham, with aqueducts and the necessary reservoir at Farnborough (Kent).

The *Lowestoft Water, Gas, and Market Bill* is to enable the Company named to raise further capital to the amount of £80,000, and to borrow accordingly, for the purpose of constructing additional service reservoirs.

The *Newcastle and Gateshead Water Bill* is promoted by the Company to obtain authority to abandon certain works, for the construction of which they obtained power last session, and to substitute others considered more suitable. No additional capital is asked for.

The *North Cheshire Water Bill* is promoted by the Company to obtain authority to raise £30,000 additional capital, and to borrow £9000 for the purposes of the undertaking. In this, as in all other cases, the dividend on the new capital is limited to the usual rate—seven per cent. per annum.

The *Ramsgate Water Bill* has already been noticed in our columns. The objects, briefly stated, are to authorize the Water Company to capitalize expended profits to the amount of £19,000, under the name of Improvement Stock, the dividend on which is limited to six per cent., to raise additional capital to the amount of £20,000, and to borrow to the usual extent in respect of both new capital and Improvement Stock. Power is also sought to acquire some land by agreement, and to enforce some ordinary regulations, set forth in a schedule, for the prevention of waste and misuse of water.

The *Stamford Water Bill* is to enable the Marquis of Exeter to give a constant supply of water to the borough of Stamford, by empowering him to make and enforce regulations necessary to prevent waste, when a constant supply is provided.

The *West Surrey Water Bill* is to extend the limits of the West Surrey Water Company over districts which are also claimed by the Sunningdale Company mentioned above. It further seeks power to raise additional capital to the amount of £25,000, with the usual borrowing power.

The following Bills are promoted by Local Authorities to obtain various powers relating to the supply of water :—

The *Bridgwater Corporation Water Bill* is to authorize the Corporation to start a water undertaking, and for the purpose to borrow £40,000. The Bill is to confer all the powers usually granted in connexion with water undertakings. The supply will be obtained by collecting and impounding the water of several small streams. The rates and extra charges mentioned are those usually proposed by water companies.

The *Perth Water Bill* is, first of all, to incorporate a new body of Commissioners, to be called "The Water-Works Com-"missioners of Perth," who will take over the water undertaking of the existing Commissioners. It is also to authorize the newly-formed body to purchase a small undertaking belonging to the Bridgend Perth Water Company, Limited, and another, the property of the Earl of Kinnoull. It will further give the Commissioners power to construct additional works, and for all these purposes to borrow £35,000. The rates will be regulated by annual expenditure, and provision for sinking-fund. There will be a public and a private rate, and as regards the latter, it is provided that the rate leviable on shops, warehouses, offices, &c., shall be only two-thirds of the rate per pound levied on dwelling-houses.

The *Ramsgate Local Board Bill* is promoted to obtain power, among other things, to make a compulsory purchase of the Ramsgate Water Company, and to borrow £60,000 for water purposes.

The *Wakefield Improvement Bill* is, *inter alia*, to purchase, by agreement, the undertaking of the Wakefield Water Company, and to borrow £250,000 for water purposes. The Company's Act will be transferred to the Corporation, so there are no special provisions relating to water supply in this Bill.

The last group we have to notice consists of Bills promoted by Local Authorities, already possessing water undertakings, to obtain further powers in connexion with them.

The *Blackburn Borough Bill*, before noticed, is to authorize the Corporation to abandon the construction of certain water-works, and make and maintain others, and to borrow £500,000 for water purposes.

The *Bolton Improvement Act* is, *inter alia*, to extend the water limits of the Corporation, and to authorize the borrowing of £85,000 for water purposes.

The *Dublin Improvement Acts Amendment Bill* will, *inter alia*, give the Corporation power to make additions to their water undertaking.

The *Edinburgh and District Water Bill* is simply to authorize the Water Trustees to construct some additional works.

The *Glasgow Corporation Water Bill* is to authorize the Water Commissioners to make considerable additions to their water undertaking. The preamble recites that the Commissioners have already borrowed for water purposes the sum of £1,358,812 14s. 7d., and this Bill is to enable them to raise the further amount of £450,000.

The *Leeds Improvement Bill* is, *inter alia*, to empower the Corporation to borrow £250,000 for the extension and improvement of their water-works.

The *Rotherham Corporation Bill* is, among other things, to extend the time fixed for the completion of works authorized by an Act passed in 1863. The Bill proposes a further period of ten years for the completion of the "Dalton" reservoir, and works connected therewith.

The *Tunbridge Wells Water Bill* is to enable the Improvement Commissioners to make certain additions to their water-works, and to raise £40,000 for the purpose.

Wotton-under-Edge Gas Company.—The directors report for the past year has been issued, and a dividend of 7 per cent. declared, leaving a balance of £81 14s. 1d. to be carried to the reserve-fund.

Neath Corporation Gas-Works.—At the meeting of the Neath Town Council, on the 19th inst., it was stated that the result of the last half year's working of the gas undertaking was most satisfactory, there being a very favourable balance to the credit of the corporation. This fact was due to the excellent management of Mr. Ellery. Although the price of gas was reduced in October last 6d. per 1000 cubic feet, a credit balance amounting to £967 7s. 7d. had been realized.

Reductions in the Price of Gas.—The directors of the Redhill (Surrey) Gas Company announce a reduction from 5s. 6d. to 5s., to take effect from the 1st ult. At Honley the price has been reduced from 6s. 3d. to 6s. At the meeting of the Huddersfield Town Council on the 21st inst., it was resolved, on the recommendation of the Gas Committee, to reduce the price from 3s. 4d. to 3s. per 1000 cubic feet. At Chorley, the Commissioners to whom the works belong, have agreed to the following alteration in the price of gas affecting large consumers:—Not exceeding 200,000, to be 4s. per 1000 cubic feet; not exceeding 300,000, at 3s. 9d.; and exceeding 300,000, at 3s. 6d.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

CXXX.

MAIN-LAYING (*continued*).

When laying mains, from the line of which the gas is not excluded, the bladder-valve, invented by Mr. George Lowe, is an indispensable appliance. This is represented in fig. 52, and consists simply of a bladder, in the neck of which a piece of $\frac{3}{8}$-inch brass tube, 6 or 8 inches long, threaded at one end, and having a stopcock at the other, is inserted; being firmly secured thereto with a piece of fine copper wire. A $\frac{3}{4}$-inch hole is drilled in the completed portion of the main, at a distance of a few yards from the end. The bladder is inserted through this hole to within about two inches of the neck, and when in that position is inflated, filling up the diameter of the main, and the stopcock is then closed. By the use of this expedient, the passage of the gas is temporarily prevented, and the work of laying the mains can be proceeded with, not only without loss of gas, but without the inconvenience and danger of the escaping gas to the men employed. For pipes of greater diameter than 6 inches, the india-rubber gas-bag, fig. 53, is used, and these are made of any required size. Accidents are occasionally caused by gas escaping past the valve, and mixing with the air in the newly laid length of main. The mixture, being explosive, has at times been accidentally ignited, with disastrous results. To obviate this, the valve should be removed daily, to a point as near to the end of the completed length of main as possible; and care should be taken to ensure that the bladder or bag is sufficient in size, and that the inflation is perfect.

Fig. 52.

Fig. 53.

The use of an instrument resembling an ordinary pressure-gauge, fig. 54, charged with quicksilver instead of water, is recommended

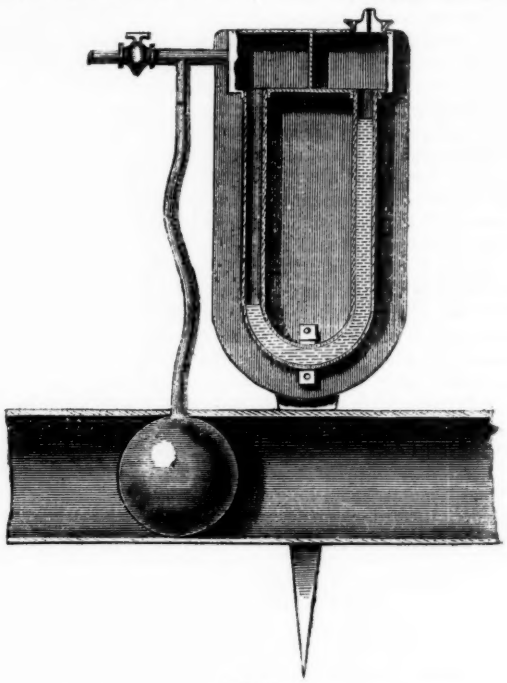


Fig. 54.

by Mr. G. Goldsmith, of Leicester, as a safeguard against accidents of the kind mentioned. When the bag is distended, and the cock closed, the column of mercury will be raised to a height indicating the pressure, and an observation of the instrument will at once show whether the inflation is maintained. Any contraction or expansion of air from sudden changes of temperature is also compensated by the rise or fall of the mercury within the tubes. The boxes at the top prevent the escape of the mercury, if driven up by any sudden expansion or contraction. Attached to the instrument is a spike for fixing it in the ground.

An ingenious contrivance, which answers the purpose of the bladder-valve, and dispenses with the drilling of the main, besides diminishing the risk of explosion, is that of the moveable elastic plug. This consists of a bag made of strong canvas, varnished, and stuffed with some suitable material, the more elastic the better. An iron pin passes through the centre of the bag, and is bolted to a wooden disc behind, all being made perfectly gas-tight. To the front end of the bolt or pin a loose iron ring is attached, and to this again a rope is fastened, fig. 55. The canvas plug, being well greased round the sides, is inserted into the first pipe, and, before connecting the next, the rope is threaded through it by means of a rod. On the con-

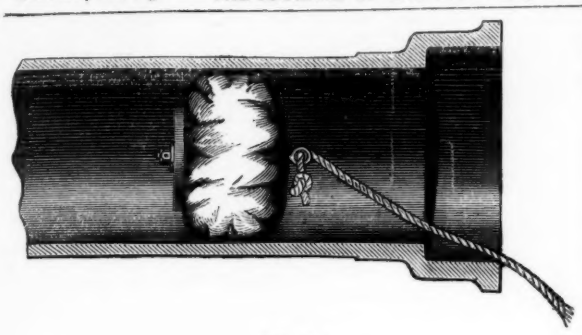


FIG. 55.

nexion being completed, the plug is drawn forward two thirds of the length of the pipe, and the process is repeated with each succeeding pipe until the whole are laid. The only objection to the moveable plug is its liability to rapid wear, owing to the friction against the pipe sides.

The open end of the last pipe, as soon as it has been driven up, should be plugged, to prevent any possible escape of gas, or the accidental entrance of soil or stones from the cutting. A wooden plug is generally used. A very handy apparatus, devised by Mr. Edwin Addenbrooke, of South Hackney, may be recommended for that purpose. It is superior to the ordinary wood plug, inasmuch as it needs no driving, it adapts itself better to any irregularities in the pipe, and does not set fast. The apparatus, fig. 56, consists of a disc of vulcanized india-rubber, A; a handle, B; and

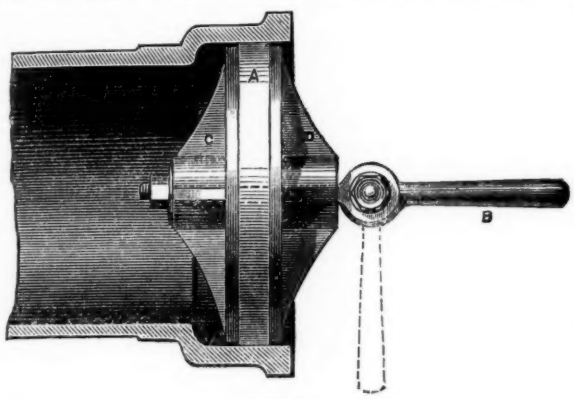


FIG. 56.

two plates, C and D. The handle has a cam action, and, when lowered into the position dotted, the rubber disc is compressed between the plates, closing the space, and adapting itself to any variations in the diameter of the pipe. In the diagram the apparatus is shown as being fixed in the socket end of the pipe; but it is, of course, equally applicable to the spigot end.

(To be continued.)

Correspondence.

QUANTITY OF BRICKWORK IN RETORT-SETTINGS.

SIR,—As a remark I made on brickwork in retort-settings, at the last meeting of the American Gaslight Association, has been the unimportant means of originating, I am gratified to find, an important discussion of the question in the JOURNAL, I may, perhaps, be permitted the privilege of adding "just one word more."

Having had my innings in a communication that, through your indulgence, may be blushing in all the glory of print before this comes to hand, I would have been "content to rest and be thankful," especially as my ideas on the subject are so much in consonance with all the right-minded of your correspondents, had it not been for the letter of "G. E. S.," in your issue of the 9th ult. Oh, that there were an Attorney-general of the gas commonwealth! I am sure an action would lie, and I am equally sure that that is more than gas managers ever do about their workings, or the quality of their gas—particularly when it is regularly tested against them by official inspectors.

The idea of this unpatriotic and seditious "scrubber"—that, I believe, is the correct word in designating anybody who dares to differ from one in newspaper controversies—unblushingly asserting that frog-eating moosoos and dirthy furriners "have given this subject much more study than has been devoted to it by English managers, and have, consequently, more definitely settled the principles upon which retort-setting should be constructed!" Why, it is enough to make the Nelson-column lions stick their tails out as stiffly as that of their late neighbour over the way on the top of Northumberland House, and turn as red as the ancient animal of Brentford.

Among my school copy-book headings, which commendably aimed at the double-barrelled utility of imparting sound moral aphorisms, expressed in elegant examples of hair strokes and body strokes, was one that I recollect was frequently laid under contribution, and which was to the effect that "evil communications corrupt good manners." The wisdom of this proverb was, I fear, but hazy to the youthful understanding; but we must all, since our school days, have seen many instances of its truthfulness, and it does appear that "G. E. S." is a melancholy case in point. He not only admits, but seemingly glories in having managed gas-works on the Continent. Need more be said? Indeed, it would not be surprising to hear, that in addition to having had his good (insular) manners corrupted by contact with outlandish, and consequently evil, communications, he even affects baggy breeches and a fluffy hat, which, of course, would be sufficient to fairly put him out of court.

But having recovered from the first shock of "G. E. S.'s" modestly expressed dictum of the superiority of the continental precepts and practice in respect of the question at issue, one is somewhat comforted with the reflection that, after all, the thing is not so serious as it at first appears, and that perfidious Albions may yet hold up their heads—a little. Belgium being "on the Continent," "G. E. S.'s" instincts have evidently impelled him to rush to the rescue of the retort-makers of that interesting country, by imparting the valuable information that two of them exhibited their goods at the Vienna Exhibition of 1873, and that they "were unquestionably the best and cheapest exhibited."

My experience of retorts, and I apprehend it is in accordance with that of others who have not been on the Continent, has been but a confirmation of the homely English saying, that "the proof of a pudding is in the eating of it;" and one can but stand by and admire the prescience of the Belgian jury who could tell the worth of a retort by merely looking at it; but then, we do not all wear spectacles. It reminds one of the immortal Rabbie's "Dr. Hornbook"—my brither Scots will know the story.

"G. E. S." conjures up a terrible phantom of his own imagination, of English settings "with cross-walls usually set with only 9-inch spaces," resulting in the "tearing asunder of the retorts lengthwise, which invariably occurs in consequence of the unequal expansion and contraction which ensue, if the retorts are built in by numerous cross-walls," and then proceeds to demolish his man of straw (to his own satisfaction) with the unanswerable argument (?) that the plan is universally condemned amongst continental engineers.

Really one almost loses patience to hear this stuff repeated, parrot-like, *ad nauseam*, and I think it may be safely affirmed that all this "tearing asunder lengthwise" nonsense is not founded on the practical experience of "G. E. S.," or G-anybody-else who knows his business.

It is difficult to understand what kind of setting "G. E. S." approves, and it is to be hoped he understands it himself. He does not appear to believe in the retorts being supported at their ends only. He "damns with faint praise" the plan brought before the last meeting in London of the British Association of Gas Managers, which, though, in his opinion, it was "a step in the right direction," yet "very poorly represented continental practice in this particular" (although it was identical in its main features with what, in another paragraph, he seems to recommend); and he equally objects to cross-walls. As brother Jonathan would say, What in thunder *does* he believe in?

The only information he vouchsafes of this wonderful "continental practice," is that, "the system followed is that of supporting the retorts thoroughly from beneath, while avoiding as much as possible to pile up weight on the top of them, and of leaving the sides of the retorts, as far as practicable, free, thus ensuring the uniform (?) distribution of heat in the setting." Well, now, if this is not just what has before been recommended, I must respectfully beg "G. E. S." to rise and explain. If it means anything at all, it means that the middle retort on each side of the furnace, in a bed of six, has to carry all the weight of the top one "on its back," and that the bottom one has to support the weight of both those above, *plus* the brickwork between them; so that having to bear this crushing-in weight, without the counterpoise of side supports, they would be apt, I fancy, like Mr. Disraeli's franchise, to be extended "laterally." And this is the patent plan to prevent retorts "tearing asunder lengthwise!" If "G. E. S." does not like this plain way of putting it, let him explain by what mysterious process all the retorts in a setting can be supported "thoroughly from beneath," without those below having to bear the weight of those above, in the way indicated. Either this must be so, or they are individually supported by independent walls, as beds of irons used to be set, by which more brickwork is required than in the settings objected to. There is the dilemma; choose which horn you like, my little dears. The utility of a moderate quantity of brickwork in retort-settings, as it appears to me, I have previously explained, and it need not, therefore, be here repeated.

Our critical friend tells how he found no difficulty in obtaining 5000 feet per mouthpiece "when abroad," but he refrains from adding what his fuel account was, or the life of his retorts. If the retorts abroad do not crack either "lengthwise" or crosswise, the assumption is that they should last indefinitely, but as to this we are left in the dark. He, however, disclaims any knowledge of even Belgian retorts lasting two or three years, when supported only at the extremities. But he is sceptical as to English or Scotch retorts producing 5000 to 6000 feet per mouthpiece with under 20 per cent. of fuel, and thinks 4000 feet and 26 per cent. of fuel about the best results obtainable.

Let me assure "G. E. S." that I have, "year in and year out," when using good Newcastle coals, produced an average of 5500 feet per mouthpiece, from 21 inch by 15 inch oval retorts, with a consumption of fuel under 15 per cent. It is true all coke sold was measured; but supposing 5 per cent. be added, which is surely liberal enough for a fair comparison with others perhaps a little less rigid in that respect, there would still be an example of a production of between 5000 and 6000 feet, with a fuel account of under 20 per cent., and with a life of retorts of about 750 days actual working. And were I in England instead of being "abroad," I would be happy—for a consideration—to produce the same results for him or "any other man."

E. S. CATHELS.

Montreal, Feb. 1, 1877.

REGULATION OF GAS-FITTINGS.

SIR,—In your last publication you give me credit for being the first to introduce into a Bill, bye-laws for the regulation of gas-fitting. Will you kindly permit me to say that I have simply copied the bye-laws of the Wallasey Commissioners, for which they obtained parliamentary sanction under an Act dated 1868? I presume, therefore, that the credit for the initiative must be given to my friend, Mr. E. H. Harris, the engineer to that board.

HENRY WOODALL.

Leeds, Feb. 24, 1877.

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, FEB. 19, 1877.

The Blackburn Borough Gas, Water, and Extension Bill was read a second time.

THURSDAY, FEB. 22.

The Lord Chancellor acquainted the House that the further Standing Orders applicable to the Lowestoft Water, Gas, and Market Bill have been complied with.

The Examiners certificate of non-compliance with the Standing Orders in respect of the Bromsgrove, Droitwich, and Redditch Water Bill was referred to the Standing Orders Committee.

Petitions were presented against the Blackburn Borough Gas, Water, and Extension Bill from (1) Lancashire and Yorkshire Railway Company, (2) Blackburn Gaslight Company; and against the East Worcestershire Water Bill from the Local Board and Town Commissioners of Bromsgrove.

FRIDAY, FEB. 23.

The Lord Chancellor acquainted the House that the further Standing Orders applicable to the Londonderry Gas Bill have been complied with.

Petitions were presented against the Blackburn Borough Gas, Water, and Extension Bill from Rev. T. Porter and others; against the East Worcestershire Water Bill from (1) the Earl of Shrewsbury and Talbot, (2) the Lady Mary S. L. Windsor Clive, as guardian of her son, the Lord Windsor, (3) Midland Railway Company, (4) Promoters of the Bromsgrove, Droitwich, and Redditch Water Bill, (5) Sharpness New Docks and Gloucester and Birmingham Navigation Company, (6) Inhabitants of Droitwich, (7) Rev. Charles Allen Dickens and other, (8) Henry Taylor and the Trustees of the Birmingham and Midland Counties Sanitorium; and against the North-East Worcestershire Water Bill from the Lady Mary S. L. Windsor Clive, as guardian of her son, the Lord Windsor.

HOUSE OF COMMONS.

MONDAY, FEB. 19, 1877.

The following Bills were read a second time and committed:—Ashton-under-Lyne Improvement; Bolton Improvement; Dukinfield and Denton Local Boards of Health; Dundee Gas; Edinburgh and District Water; Glasgow Corporation Water; Hanley Corporation Gas; Leeds Improvement; London Corporation; Longton Corporation; Maryport District and Harbour (Gas); Middlesbrough Corporation; Perth Water; Ramsgate Local Board; Rotherham Corporation; Stamford Water; Sunningdale District Water; Tudhoe and Sunderland Bridge Gas; Tunbridge Wells Water; Wakefield Improvement.

A petition for additional provision in the Bolton Improvement Bill was referred to the Examiners.

Reports from the Examiners presented that the further Standing Orders applicable to the following Bills have been complied with:—Coatbridge Gas; Christchurch Gas; Bishop Auckland District Gas; Falmouth Water; Ashton-under-Lyne Gas; Stretford Gas; Thanet Gas; Ramsgate Water; West Surrey Water; Alliance and Dublin Consumers Gas (Bray Supply); Croydon Commercial Gas; Carshalton Gas.

Petitions were presented against the Newcastle and Gateshead Water Bill from Corporation of Newcastle-upon-Tyne; and against the Newcastle-under-Lyme Borough Extension and Improvement Bill from (1) Inhabitants of Wolstanton (in vestry assembled), (2) Guardians of the Poor of Wolstanton and Burslem, (3) Owners, &c., of Wolstanton.

TUESDAY, FEB. 20.

The following Bills were read a second time, and committed:—Bridgwater (Corporation) Water; Bristol District Water; Carnforth District Water; Sittingbourne Gas; Burslem Local Board.

Reports from the Examiners presented that the further Standing Orders applicable to the Leicester Gas and the Louth Gas Bills have been complied with.

A petition against the Hanley Corporation Gas Bill was presented from the British Gaslight Company.

Mr. Alexander Brown's motion, in reference to the Water Supply of Villages and Rural Districts, was deferred to Friday, Feb. 23.

PROPOSED SEWAGE FARM ON MITCHAM COMMON.

Mr. FAWCETT asked the President of the Local Government Board whether if, as reported in the public journals, the local authorities of Croydon had decided to apply for permission to convert 100 acres of Mitcham Common into a sewage farm, he would promise either to refuse the application, or not to grant it until the House had had an opportunity of expressing an opinion upon the proposed conversion to such a purpose of a considerable portion of a valuable open space near the Metropolis.

Mr. SCLATER-BOOTH said that no official communication had been made to him to the effect suggested by the question. He had, however, seen in a newspaper a statement that the Rural Sanitary Authority at Croydon had it in contemplation to make such an application for 100 acres of Mitcham Common. It appeared by the same report that the consent of more than 100 persons would have to be obtained before such an application could be entertained, and it would be impossible, whatever his views might be on the matter, for him to make any order on the subject without Parliament having ample opportunity of expressing an opinion on the proposal.

WEDNESDAY, FEB. 21.

The Limerick Gas and the Newcastle-under-Lyme Borough Extension and Improvement Bills were read a second time and committed.

Petitions against the following Bills were presented:—Ashton-under-Lyne Gas, and Ashton-under-Lyne Improvement Bills, from Stalybridge Gas Company; Bolton Improvement Bill from (1) Richard Henry Ainsworth, (2) Thomas Heaton and Joseph Heaton, (3) John Adams Walker and others, as trustees of the will of Robert Walker deceased, (4) Rural Sanitary Authority of the Bolton Union District; Heywood Water Bill from Earl of Derby; Sunningdale District Water Bill from Staines, Wokingham, and Woking Railway Company; Perth Water Bill from Guildry Incorporation of Perth (petitioners not praying to be heard).

THURSDAY, FEB. 22.

Examiner's reports presented, that the further Standing Order applicable to the Kent Water, the Wakefield Gas, and the Warrington Corporation Gas Bills has been complied with.

Petitions against the following Bills were presented:—Ashton-under-Lyne Gas Bill from Corporation of Ashton-under-Lyne; Ashton-under-Lyne Improvement Bill from (1) Lancashire and Yorkshire Railway Company, (2) Dukinfield Gas Company; Bishop Auckland District Gas Bill from Bishop Auckland Local Board of Health; Bolton Improvement Bill from (1) Messrs. Holt and M'Adam, (2) Lancashire and Yorkshire Railway Company, (3) Radcliffe and Pilkington Gas Company, (4) Duke of Bridgewater's Trustees, (5) Sarah Ann Rostron, (6) Messrs. Callender, Callender, and Dawson, (7) Owners, &c., of property and ratepayers of Tonge-with-Haulgh; Bristol District Water Bill from Lawford's Gate District Highway Board; Christchurch Gas Bill from Owners, &c., and ratepayers of Christchurch; Dukinfield and Denton Local Boards of Health Bill from (1) Hyde Gas Company, (2) Dukinfield Gas Company; Hanley Corporation Gas Bill from Tunstall Local Board of Health; Heywood Water Bill from Lord Egerton of Tatton; Leeds Improvement Bill from (1) Fire insurance companies, (2) Owners of houses, &c., in Leeds, (3) Trustees of the White Cloth Hall at Leeds, (4) Trustees of the Coloured Cloth Hall in Leeds; Longton Corporation Bill from Inhabitants of Blurton and other places; Newcastle and Gateshead Water Bill from John Giffard Riddell; Perth Water Bill from (1) North British Railway Company, (2) Feuars of the Earl of Kinnoull; Tunbridge Wells Water Bill from the Rev. Robert Stammers Tabor; Wakefield Improvement Bill from Lancashire and Yorkshire Railway Company.

FRIDAY, FEB. 23.

The Examiner's report—"That the Standing Orders have not been complied with in the case of the petition for additional provision in the Bolton Improvement Bill"—was referred to the Select Committee on Standing Orders.

Petitions against the following Bills were presented:—Alliance and Dublin Consumers Gas (Bray Supply) Bill from (1) Corporation of Dublin, (2) Dublin, Wicklow, and Wexford Railway Company; Ashton-under-Lyne Gas Bill from Earl of Stamford and Warrington; Ashton-under-Lyne Improvement Bill from (1) Earl of Stamford and Warrington, (2) Dukinfield and Denton Local Boards; Bolton Improvement Bill from (1) Henry Sykes Thornton and Henry Gerrard Hoare, (2) Arthur Bailey, (3) William Hampson, (4) John Fogg Elliot, (5) James Fogg, (6) Sir Charles Henry Tempest, baronet, (7) Thomas Cross and Company, (8) John Knowles and others, (9) William Hargreaves and Charles Wolfenden, as trustees under the will of William Jackson Rideout, deceased, (10) William Ford Hulton, (11) Owners, &c., Township of Turton, (12) Owners, &c., Township of Great Lever, (13) John Hesketh, (14) George Slater, (15) Earl of Bradford; Bridgwater (Corporation) Water Bill from Great Western Railway Company; Bristol District Water Bill from (1) Great Western Railway Company, (2) Corporation of Bristol, (3) Bristol Water-Works Company, (4) William Tanner; Bristol United Gas Bill from Great Western Railway Company; Carnforth District Water Bill from (1) Corporation of Lancaster, (2) London and North-Western Railway Company; Epsom and Ewell Gas Bill from (1) Gas consumers at Epsom, (2) Gas consumers at Ewell, (3) Sutton Gas Company; Gaslight and Coke Company Bill from Corporation of London; Heywood Water Bill from (1) Blackpits Cotton Spinning and Manufacturing Company, Limited, (2) Robert Hopwood Hutchinson and Mary Susan Hutchinson, (3) William Stott and Elizabeth Stott, (4) Alice Haworth and others; Leeds Improvement Bill from (1) Lord Stourton, (2) George Lane Fox, (3) Lancashire and Yorkshire Railway Company; Leicester Gas Bill from Corporation of Leicester; Middlesbrough Corporation Bill from North-Eastern Railway Company; Newcastle-under-Lyme Borough Extension and Improvement Bill from Guardians of the Poor, Churchwardens, &c., of Stoke-upon-Trent, in vestry assembled; Perth Water Bill from (1) Earl of Kinnoull, (2) Inhabitants and ratepayers of Perth, (3) Perth Water Commissioners; Ramsgate Local Board Bill from (1) Ramsgate Water-Works Company, (2) Isle of Thanet Gaslight and Coke Company; Rotherham Corporation Bill from Corporation of Doncaster; Wakefield Improvement Bill from Justices of the Peace for the West Riding of the County of York; Warrington Corporation Gas Bill from (1) Property owners and ratepayers of Warrington, (2) London and North-Western Railway Company; Waterford Gas Bill from Corporation of Waterford; West Surrey Water Bill from Staines Local Board.

Mr. Alexander Brown's motion was further postponed to Friday, March 16.

PRIVATE BILL LEGISLATION.

Mr. CAWLEY gave notice that on Tuesday, Feb. 27, he would call attention to the Private Bill Legislation of this House; and move the following resolutions:—

1. That it is desirable to extend the system of legislating by Provisional Order, especially in the following particulars:—
   - (*a.*) That applications to the Department granting Orders should be made at any period after public notice and notice to parties interested;
   - (*b.*) When any memorial is presented to the Department against the granting of such Order, a local inquiry should be held;
   - (*c.*) The Department to present Bills to Parliament for confirming Provisional Orders as early as convenient;
   - (*d.*) The Gas and Water Facilities Act to be amended so as to enable local authorities to apply for Provisional Orders;
   - (*e.*) That Provisional Orders should apply to railway companies requiring additional land or additional capital;
   - (*f.*) That similar rules of procedure should apply to each Department granting Provisional Orders;
   - (*g.*) In cases where any petition shall be presented against the confirmation of a Provisional Order, the Department should report to the Commissioners the facts on which the Order was granted, and no opponent should be permitted to give evidence on any point not raised at the local inquiry;
   - (*h.*) Where Provisional Orders apply, direct application to Parliament not to be allowed;

2. That where any Provisional Order or Private Bill containing a provision inconsistent with the general law, the fact and the reasons which render the alteration advisable should be reported to the House.

SATURDAY, FEB. 24.

Petitions against the following Bills were presented:—Ashton-under-Lyne Gas Bill from Owners and occupiers of property in Ashton-under-Lyne; Ashton-under-Lyne Improvement Bill from (1) Consumers of gas in Ashton-under-Lyne, (2) Ashton Gas Company, (3) London and North-Western Railway Company; Bolton Improvement Bill from (1) Westhoughton Local Board, (2) Westhoughton Consumers Gas Company, (3) Henry Gerard Hoare and Henry Seymour Hoare, (4) London and North-Western Railway Company; Bridgwater (Corporation) Water Bill from the Earl of Bessborough and others; Bristol District Water Bill from Midland Railway Company; Bristol United Gas Bill from Joseph Roach and others; Crystal Palace District Gas Bill from Metropolitan Board of Works; Dukinfield and Denton Local Boards of Health Bill from (1) Corporation of Ashton-under-Lyne, (2) Consumers of gas and ratepayers in Dukinfield, (3) London and North-Western Railway Company; Gaslight and Coke Company Bill from Metropolitan Board of Works; Glasgow Corporation Water Bill from Caledonian and Glasgow and South-Western Railway Companies and others; Heywood Water Bill from (1) Messrs. Kelsall and Kemp and others, (2) Joseph Fenton and others, (3) James Wrigley and Sons and others, (4) Heywood Local Board; Kent Water Bill from (1) London, Chatham, and Dover Railway Company, (2) South-Eastern Railway Company; Leeds Improvement Bill from (1) Aire and Calder Navigation Company, (2) Low Moor Company, (3) Edward Horner Reynard and Thomas Greenwood Teale, as trustees of the settled estates of the co-heiresses of the late John Smyth, (4) Midland Railway Company,

(5) Earl Cowper, (6) Earl of Harewood, (7) North-Eastern and London and North-Western Railway Companies, (8) Rothwell Local Board, (9) Leeds and Liverpool Canal Company, (10) Great Northern Railway Company; Limerick Gas Bill from Corporation of Limerick; Longton Corporation Bill from the Duke of Sutherland; Newport (Monmouthshire) Gas Bill from Corporation of Newport; Perth Water Bill from (1) Caledonian Railway Company, (2) Perth General Station Committee, (3) Bridgend of Perth Water Company, Limited; Ramsgate Local Board Bill from (1) Corporation of Margate, (2) London, Chatham, and Dover Railway Company, (3) Owners and occupiers of St. Lawrence; Ramsgate Water Bill from (1) Ramsgate Local Board, (2) Ratepayers, &c., of St. Lawrence; Sunningdale District Water Bill from London and South-Western Railway Company; Thanet Gas Bill from (1) Broadstairs Gas Company, (2) Ramsgate Local Board, (3) Ratepayers, &c., of St. Lawrence; Tunbridge Wells Water Bill from (1) Benden Sharvell Hassell, (2) Guardians of the Poor of Tunbridge Union, (3) Inhabitants of Pembury, in vestry assembled, (4) Inhabitants and ratepayers of Tunbridge Wells, (5) Viscountess Falmouth; United General Gas Company (Limerick) Bill from Corporation of Limerick; Wakefield Gas Bill from Corporation of Wakefield; Wakefield Improvement Bill from Aire and Calder Navigation Company; Woolwich, Plumstead, and Charlton Consumers Gas Bill from the Metropolitan Board of Works.

A petition against the Bristol District Water Bill (the petitioners not praying to be heard) was presented from Citizens and ratepayers of Bristol.

Legal Intelligence.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

THURSDAY, FEB. 22.

(*Before Vice-Chancellor* BACON.)

ATTORNEY-GENERAL *v.* BURSLEM LOCAL BOARD OF HEALTH.

Mr. KAY, Q.C., on behalf of the informant, the Duke of Sutherland, moved for an injunction against the Burslem Local Board of Health, to restrain them from fouling a stream running into the river Trent, above Trentham Hall. He said the present was one of a series of suits which the duke had instituted against the local authorities. In several cases he had obtained an injunction, and his lordship was prepared to carry out his present system of proceedings until he succeeded in getting the river Trent into a wholesome condition. He (Mr. Kay) was instructed that the Local Board of Health did not intend to contest the matter, and they consented to treat the present motion as the hearing of the action, and that judgment should be given for the plaintiff in the following terms:—A perpetual injunction against the defendants to restrain them, their servants and agents, from causing or permitting the sewage or filthy water in their district to flow or pass through their main sewer and its respective outfalls into the brook or river Trent without its being first purified or deodorized, so as not to create a nuisance. The duke, in order to show that he was not at all desirous of putting the parties to unnecessary inconvenience, had consented that the injunction so awarded should not be put in force until after the expiration of two years from the present date. The defendants were to pay the costs of the duke after taxation, and there would be liberty to apply. Therefore, the matter would be set down *pro formâ*, and the judgment given, in the terms arranged, for the plaintiff.

Mr. WILLIS appeared for the defendants, and consented to the arrangement.

Miscellaneous News.

METROPOLIS WATER SUPPLY.

METROPOLITAN BOARD OF WORKS.

The usual Weekly Meeting was held on Friday last—Sir J. HOGG, M.P., in the chair.

The Works and General Purposes Committee presented the following report:—

Your committee have proceeded upon the resolution of the Board of the 2nd inst., referring to them for consideration and report the whole subject of the water supply of the Metropolis, especially as to the advisability of introducing a Bill into Parliament to authorize the Board to purchase the interests of the several water companies.

It is scarcely necessary to remind the Board of the long and anxious consideration which this question has already received at its hands, both before and since the passing of the Metropolis Water Act of 1871. It may, however, be well to refer to a report which was made by your committee on Feb. 7, 1873, upon the regulations made under the provisions of that Act, and as to the steps to be taken by the Board, in which they expressed an opinion that, having regard to the imperfect state of legislation, by which no real and effective constant supply was secured; the exclusion of the Board from any jurisdiction which could be exercised in favour of the consumers, the great cost which the regulations would impose upon the owners of property, and the almost unlimited authority placed in the hands of the water companies, the Board should at that time take no steps with a view to giving notice for a constant supply of water in any of the districts of London.

Your committee further stated that in all probability the attention of Parliament would be directed to the working of the Act and the probable need of its amendment, so that by some more satisfactory legislation a sound system of well-regulated water supply, independent of the views and commercial interests of companies acting for separate districts differently organized, might be secured, and they recommended that the question should be referred back to them with authority to make a representation to Her Majesty's Government thereon.

That report was adopted, and your committee subsequently endeavoured to obtain an interview with Mr. Gladstone, who was then Prime Minister, but owing to the pressure of public business he was unable to receive the proposed deputation. The subject, however, continued to occupy the constant attention of the Board, with reference not only to the supply of water for domestic and general use, but also for the extinction of fires, and on the 25th of February in last year, upon a report presented by the Parliamentary Committee, the Board adopted a resolution that the most effective mode of dealing with the question would be to obtain power to carry out the recommendation of the Royal Commission of 1869, presided over by the Duke of Richmond, the present Lord President of the Council, that the supply should be in the hands of the responsible public authorities; and the matter was referred back to the Parliamentary Committee, with instructions to confer further with a committee of the Corporation of London, with whom they had already, under the authority of the Board, been in deliberation.

The committee, on the 2nd inst., reported that they had for some time been awaiting a communication as to the course which the Corporation proposed to take, and as no communication had been received, they recommended that the reference to them should be discharged, which was accordingly done.

Your committee having briefly referred to the previous action of the Board upon this question, have now to report the conclusion to which, after careful deliberation upon the present reference, they are led, and this is that the time has arrived when effect should be given to the Report of the Royal Commission of 1869, so far as the same refers to the water supply of the Metropolis being placed under the control of a responsible public body.

They recommend, having regard to this opinion, that the subject be referred back to them with instructions to prepare a Bill empowering the Board to take under their control the water supply of the Metropolis, with power to purchase the existing companies and extend existing works, and that the committee be authorized to confer with Her Majesty's Government and report the draft Bill to the Board.

Mr. ROCHE, chairman of the committee, moved the adoption of the report. He said the whole question of the water supply of London was a question that for many years had been under the consideration of the Board. Ever since the year 1869, he thought, this question had been more or less before them. It had been reported on from time to time, and the Board had over and over again expressed their opinion with regard to it. He thought it impossible that any question could come before the Board, or that the Board could deliberate upon any question, of more vital importance to the health of the four millions of inhabitants of this great Metropolis, than the water supply of London. In considering the question now, the Board had this advantage, that the most complete information was before them. The subject had been exhausted so far as inquiry went. There was nothing more to learn so far as evidence could give them information upon the subject, and there was only one thing now remaining to be done in connexion with it, and that was action. The reference to the committee was passed on. The matter had been most carefully considered by the committee, who now brought up the recommendation set out on the paper—true, not quite unanimously, but by so large a majority that he thought that there was little doubt but that the Board would sanction that which the committee recommended. The recommendation of the committee was that effect should be given to the resolutions of the Royal Commission on Water Supply. That Commission was held in 1869; and the most eminent engineers were examined before that Commission. They took evidence as to the supply of water to all the large towns in the United Kingdom, and also extensive evidence as to the sources of supply, and, as he had said, the evidence taken before that Commission really exhausted the whole question, so far as evidence was concerned, as to what ought to be done relative to the future supply of London. They recommended that the supply of water to the Metropolis should be in the hands of the public municipal authority, and they stated very distinctly their opinion that it was one of the principal functions of all municipal authorities to supply that great necessary of life—water—to the inhabitants; that it was a municipal concern, and that the introduction of private companies for the supply of water to large towns was a new practice, but that it was a fundamental error. Numerous towns throughout the country were formerly supplied by private companies, but they had all reverted back, in accordance with what the Commissioners termed the ancient and sound principle, to the municipal authorities, and they pointed out that the supply of water for all sanitary purposes, for the extinguishing of fires, for the cleansing of streets, for the flushing of sewers, and the supply of a sufficient quantity to the poorer classes of the inhabitants, were questions which affected the inhabitants so largely that it was essentially a municipal concern, and that no private commercial company could be expected satisfactorily to carry out the supply of such a necessary of life. Those were the conclusions to which the Commission came after a most careful inquiry. They then proceeded to recommend that the supply of water should be in the hands of the responsible public authorities. That being so, the question arose as to what should be the public authority to take up the question in the Metropolis. They had been waiting some length of time, having been threatened from time to time and from year to year that there was to be some kind of reorganization of the government of London, and that when the proposed new body was constituted, that body would be sufficiently powerful to carry out the recommendations of the Royal Commission. Well, they had waited patiently for those gentlemen who were going to bring about that great change. It was many years since the idea was first promulgated, and he had no doubt that many years would yet elapse before the Government would be prepared to take into consideration this very difficult and most important question. But pending any such change, he trusted the members of the Metropolitan Board of Works had made up their minds that there should be no further delay in this matter, and that, so far as the Board were concerned, they were prepared to carry out the recommendations of the Royal Commission, if the Government were prepared to support them in their determination to do so. His friend (Sir W. Codrington) entertained a somewhat peculiar idea upon one important part of this subject, and, therefore, he would refer further very shortly to the recommendation of the Commission, and he thought the gallant general would see that what they recommended with reference to the constant supply system was not what he would be likely to object to if the supply were in the hands of the Board, and not in the hands of private trading companies. He hoped it would not be misunderstood for a moment that one of the great objects of the Board was to obtain a constant supply of water throughout the length and breadth of the Metropolis; but the Commissioners pointed out the great difficulties that would have to be encountered in introducing that system so long as the supply was allowed to remain in the hands of private companies, and until it was vested in some public body. They stated that in most distinct terms, and, if proof was wanted, they had the most abundant testimony in what had been done since 1869. Lord Aberdare, in 1870 or 1871, brought in a Bill for the purpose of vesting in the Board the power of purchasing up the water companies; but the interests of the companies at that time were too strong even for the Government, for he believed shortly after the Government went out of office. The present Government, however, were quite strong enough to set aside the vested interests of the companies, and to support the Board. Referring further to the previous legislation on this subject, he asked what had been the result. It had been found utterly impossible to carry out the constant supply system under the Act of 1871, and, as he had said, it was laid down by the Royal Commission that there was no chance of its being carried out so long as the supply remained in the hands of private companies. That view, as he had pointed out, had been amply and fully confirmed. But there was another reason why the supply should be in the hands of the public authorities, and it consisted in the fact that by levying a small general rate all over the metropolitan area, they would be enabled to give, in the course of a very few years, a constant supply to every part of the Metropolis. Then it was pointed out that one of the necessary results of such a transfer would be that there would be a compulsory supply to the poorer classes of the community, and when they looked at the character of the rookeries they had recently inspected, when dealing with the proposed schemes under the Artizans Dwellings Act, they could form an idea of the value of an efficient supply of water in such a direction. After alluding to one or two other points, the Commission referred to the necessity for a constant supply for extinguishing fire. Upon this question most positive evidence had been given before the Fire Brigade Select Committee of the House of Commons, that so long as the supply remained in the hands of private companies, and the pressure was continued as at present, it would be a perfect waste of money to place hydrants in the streets of London, as was done in other large towns, and that until there was a municipal authority having charge of the supply of water, whereby a constant and proper pressure could be secured, it would be utterly useless to go to the expense of laying down those hydrants which general opinion seemed to think necessary for the proper protection of the Metropolis from fire. Then as to the financial question, which was regarded by the Commission as so important, to him it appeared the least important of all. He was not about to go into figures on the present occasion, but, taking a broad and comprehensive view of the matter, he felt justified in saying that he believed the Board would be able to purchase the interests of the companies, and to supply water to the consumers hereafter at a less total cost than it was

now being supplied at, and even to effect a considerable saving. Indeed, financially, there was no difficulty whatever; and that being so, they had only, as he thought, to ask the Corporation of the City of London to give them their cordial support in carrying out this great measure, which was so essential to the inhabitants of the Metropolis at large. The committee of the Board had had the pleasure of meeting a committee of the Corporation and discussing this matter many times, and he might state that they were unanimously of opinion as to the necessity of placing the water supply of London under municipal control, and that if there was to be any remedy for the evils arising out of the present state of things, it must be by the transfer of the undertakings of the several companies to the authorities. He had no doubt, therefore, that in the proposition now before the Board they would have the cordial co-operation of the Corporation. Referring again to the financial question, he would remind the Board that by the transfer of the companies they would get rid of a very large amount of the present expenditure connected with the supply of water, arising from the necessity of different boards of directors, and the numerous officers employed by the various companies, as well as the other charges incident to the existence of so many separate centres of action. He thought it not at all improbable that the amount of money which would be so saved might be calculated at £100,000 a year, which sum could be employed in the erection of hydrants throughout the Metropolis, so that in a very few years London would be in a position, as to the means of extinguishing fires, second to no town in England. The four great objects proposed by adopting the resolution of the committee were these:—First of all they were satisfied that they could obtain greater purity of supply. This was absolutely essential, and there was no difficulty in securing it, providing it were attempted by those who had the interests of their constituents at heart, and not by private companies, who had only their own interests to serve. The second object was a constant and a copious supply, and also a compulsory supply to the poorer districts of the Metropolis. They would propose, also, to give greater facilities for the supply of water for extinguishing fires, cleansing streets, and flushing sewers. The water now used for the purpose of extinguishing fires was not paid for by the Metropolis at large, but by the consumers of water. What could be more unfair than that water used for municipal purposes—for the cleansing of streets, flushing of sewers, and extinguishing fires—should be charged upon those who consumed water, and not upon the public at large, who had the benefit of the water so used? The result of the altered state of things would be that, if paid for by a public rate, the charge upon the consumers would be less than at present. The last object proposed by the resolution was that the Board would be enabled to supply water to the consumers at a less cost than it was now supplied by the companies. These were the objects the committee had in view in recommending the report to the adoption of the Board, and he trusted the Board would see their way to carry out the proposition by a large majority. Indeed, he was not aware that there would be any opposition to it; but if there was, he was sure the Board would listen with all attention to what might be urged on the other side. If the motion was carried, he trusted the committee would take the matter up with a firm determination to do their duty to the utmost of their power, and having prepared a Bill, would then see the Home Secretary, and ask whether the Government were willing to support the measure. Of course, the Bill would not be introduced into Parliament this year, but in the meantime there would be much work to be done in preparing the scheme. When the matter was brought before the Home Secretary, it would be for him to say whether he was prepared to assist the Board in their endeavours to acquire the undertakings of the companies. Whether he would or not, it was impossible to speak with certainly; "sufficient unto the day is the evil thereof;" but he (Mr. Roche) thought that, considering the motto of the present Government was "*Sanitas sanitatum*," the Home Secretary would not be likely to "throw cold water" upon a scheme so calculated to benefit the inhabitants of the Metropolis at large, and more especially the poorer classes, for whom the right honourable gentleman had laboured hard in carrying out his Artizans Dwelling Act.

Mr. Walker seconded the motion, and said he believed every vestry in the Metropolis would approve the course which it was recommended to the Board to take. The feeling of discontent out of doors with the present state of things was becoming greater than ever, owing to the advances made in the water-rates, and so strong was the feeling, that it was felt to be imperative that the exclusive privileges of the companies should be rescinded. He attached great importance to the flushing of the sewers and the cleansing of the streets, and these things could not be efficiently done until the Board had the control of the water supply. He believed the Government would assist in the movement.

Mr. Fowler said he did not rise to offer any objections to the recommendations of the committee, but he thought the Board ought to have before them more ample details of the financial operation involved in it. Certainly no such details of the proposition, which the mover said was easy of accomplishment, had yet been furnished. In the year 1870 the Board took this matter into their consideration, and at that time a very full debate took place upon it. They were then favoured by the accountant of the Board with a statement of the position of the several companies, and an estimate of the cost of buying up their respective works, and also of what would be the probable sinking-fund required to reduce or extinguish in the course of years the original cost of the purchase and transfer. At that time it was put forward as a very feasible matter to be aimed at by the Board, with the view not only of decreasing the charge to the consumers, but also eventually of reducing the capital sum required in the transaction. But since that time a very great change had taken place in the circumstances of the case. First of all, the Valuation Act had come into operation, and this had resulted in a very large increase in the water-rates to be paid by the consumers. Supposing the companies had now to be bought up, they would have to be bought up on the basis of the increased rates they were able to levy. This, of course, would disturb very seriously the calculations which were the basis of the arrangements then proposed to be made, and which it was thought made it desirable for the Board to acquire the undertakings. In addition to that—and it was no use blinking the fact, although, perhaps, the opinion was not universally entertained—there was a strong impression that the Board would have to depart from the recommendation of the Royal Commission in 1869, which was founded upon a continuation of the source of supply from the Thames. It would not be considered by many for the public advantage, and, at all events, certainly not as a proper settlement of the question that the Board should rely upon a Thames supply for the future requirements of the Metropolis. The report of the Commissioners was very conclusive on that point; but there were two sides to the question, and many persons thought the Thames was not a proper source, and that the supply should be drawn from springs outside London, or that it should be taken from the chalk; while others thought they ought to go to the Cumberland or Welsh Lakes for a supply. This was an important ingredient in the consideration of the question now before the Board, and, therefore, when the vice-chairman (Mr. Roche) told them that if the Board took the matter into their own hands, the public would be furnished with water at a cheaper rate, he ought to have told them in distinct terms, and upon a carefully prepared financial statement, how he made it out. It must have been a mere speculation on his part. Mr. Roche could not state distinctly that the public would be satisfied with the Thames as a source of supply in the future, and, therefore, his conclusions as to a cheaper rate were not supported. There was no doubt that the question now submitted to the Board had been brought prominently before the public, in consequence of the higher water-rates imposed upon consumers since the Valuation Act had come into operation, and, in consequence of the great anomalies which existed with regard to the assessment of those rates. The Royal Commissioners of 1869 laid down the best basis for such an assessment, so that the burden should not press so heavily upon the poorer classes. Another difficulty in the public mind was that surrounding the question of a constant water supply. One of the main recommendations insisted upon by the Commissioners was the necessity of giving a constant supply—not only a constant, but also a copious supply—in order to relieve the distress such as had occurred at Bermondsey, and some of the poorer districts. He (Mr. Fowler) believed that if the Board at that time had taken up the question they would have achieved a great success, and no doubt it ought then to have been undertaken. He did not oppose the recommendation of the Works Committee, but he felt that, before pledging themselves to anything, the Board ought to look at the question all round, and that at the present moment they stood in need of more information. He would like to have the matter referred to the engineer, for he must state that, with all respect for the talents of the vice-chairman, that gentleman had not given him such satisfaction as would justify him in recording his vote for the motion. Everything, as yet, seemed to be founded upon surmise, without any figures at all. At the same time he agreed in the principle that the water supply of the Metropolis should be in the hands of the municipal authority; indeed, that was a proposition which he thought no one could dispute. But he was of opinion that the Board ought not to come to a decision on the matter that day, nor to pledge themselves to a certain course without having a statement of figures before them as to the cost of the proposed transfer, and without having satisfied themselves as to the future source of water supply, and without some notion of what the rates to be charged hereafter would be. He would not propose any amendment, but he was reluctantly in the position of not being able to vote for the motion. He would rather that the question was adjourned until the Board were in possession of further and more definite information.

Mr. Richardson thought the only reasonable conclusion they could come to, with the information in their possession, was that they ought to affirm the principle that the Board were the proper authority in whom the water supply should be vested. As to the financial question, he believed they would make a profit and not a loss by the transfer of the undertakings of the companies. Taking the most extravagant view of the matter—viz., that they would have to give 25 years purchase of profits, that would be only 4 per cent., and the Board could borrow money at 3½ per cent. It must be remembered, also, that the supply given by the companies was not of the very best kind. The consideration of the source of their supply was the main basis upon which the Board would compensate the companies for their interest, and if that was not a permanent source, it would be so much in favour of the Board. He did not suppose they would have to go to Cumberland or Wales for a supply; that could not be entertained for a moment; there was plenty of water within the area of the Metropolis—good, pure water—to be obtained, and he ventured to say that, if the question was referred to the officers of the Board, they would soon discover it. He concurred in the recommendation of the committee, and trusted it would receive the almost unanimous support of the Board.

Mr. Rogers thought it was admitted that the Metropolis required to have a better supply of water, and that it was better the control of that supply should be in the hands of the Board, and not in those of a number of private companies. It was said that the Thames was not good water, but he believed it was fairly good; still, if it was proved not to be so, he did not see why the Board, as the local authority, should not be the body to obtain water from other sources. The fact that this would cost more money was no answer to him, and no reason why he should not support the motion. It was well known that in Manchester and other large towns corporations did take upon themselves the supply, and if some of them did not make a profit, that was no argument against the adoption of a similar course in the Metropolis. Water was a prime necessity, and ought to be supplied to the community irrespective of considerations of profit. On financial grounds, the recommendation of the committee was perfectly unanswerable. The Board were not asked to buy something that would be a burden upon the rates, but a going concern, out of which a large profit would be made for the consumers. Still, as he said before, the important point to his mind was the necessity for furnishing the public with a supply of good water, and in considering that matter the Board must not be discouraged because some persons were ready to carp at the price to be paid for it. He believed, however, they would not be incurring any serious liability; they would be buying a going concern, merely changing the holders of the capital in the undertakings. He was surprised at the observations made by Mr. Fowler, who on the gas question had shown himself a thorough reformer. Mr. Fowler asked for more information; during the course of the year he would have every opportunity for obtaining it. His own impression at first was that before preparing a Bill the Works Committee should have gone to the Home Secretary and ascertained whether the Government would support such a proposition, but since they had had the boldness to come before the Board with the proposition in their report, he was not at all inclined to oppose them. He was glad they had the courage to do so, and hoped there would be no carping about the financial question.

Sir W. Codrington said the subject before the Board was a large one, and he felt that it had not had sufficient attention given to its details to enable them, as yet, to come to a decision upon it. Here they had a report brought up from the Works Committee, which pledged the Board to give effect to the recommendations of the Royal Commission; *i. e.*, the Board were to purchase the undertakings of the water companies, and to carry on throughout the whole of London a system of constant supply. This was a question, in the first instance, of some £15,000,000 or £16,000,000—some had even mentioned £20,000,000—and this question had been decided, as far as he remembered, at one discussion of one committee. He thought, therefore, he was justified in saying that the question was brought before the Board without the full consideration it ought to have had. He would move as an amendment—"That the question be referred back to the committee for further consideration and report." He would not enter into the question as to the advisability of the water supply being in the hands of the municipal authority. There could be no abstract objection to the proposition; probably the supply in such hands could be better controlled, supposing the area of supply was not so large as to be unmanageable. In Manchester, Liverpool, and Birmingham it was done with great facility; but he apprehended a different state of things obtained in London, and it might be found impracticable to adopt the same plan there. He noticed that there was a difference in the notice of the committee's report on the *agenda* and the report of the commissioners to which it referred. The *agenda* stated that the committee proposed to place the water supply in the hands of the Board; but the report of the

Royal Commissioners recommended the adoption of the system of constant supply, which was not mentioned in the *agenda*. Before deciding, therefore, to give effect to the report of the Royal Commissioners, the Board ought to go into the question of "constant supply," and understand what it meant. He did not suppose that any one in London would object to a real constant supply. People generally imagined that a constant supply meant such a supply that by merely turning a tap they would get as much water as they wanted. Now that was an entire misunderstanding, and did not at all represent what would be the state of things under such a system. It would be a constant limited supply, and no one knew better about that than the directors of the companies themselves. What was the view placed before the committee in 1871? The water companies really wanted to have a key ferrule adopted in connexion with the "constant supply," the effect of which would be that it would take a housemaid half an hour to fill a pail with water. And what was now the law? The law was that the consumers should only have a ½-inch supply-pipe. That was not what he should call a constant supply, but rather a very limited supply. Besides all this, there was the immense interference which would take place with the fittings of every private house. The most inquisitorial arrangements would be necessary if a constant service was adopted. Let honourable members refer to the Regulations Act, 1871, if they wanted to understand what pleasant little interferences would take place in every house in London. Were the Board prepared to pledge themselves to a system involving such an amount of supervision? There were about 490,000 houses in London, about one-third of which were rented under £20 a year. At least, therefore, two-thirds of those houses would probably have cisterns in them—cisterns adapted to what was called the intermittent system. Now, the first idea of the water companies and of the Royal Commission was that there should be no cisterns at all in the houses. But that was found to be impracticable; it was absolutely necessary there should be cisterns. What, then, were the arrangements to which consumers would be liable under a constant water supply? In the first place, every lead pipe in the houses would have to be altered; the public would be given over to the tender mercies of an army of plumbers. Every house from, say, £30 a year up to £300 or £400 would be liable to these alterations, and taking the average, and adopting the opinion of engineers and others acquainted with the subject, the cost would be £12 a house. This would amount to about £4,000,000, an expenditure which would be thrown upon the private consumers before what was called a constant supply (but which he called a limited supply) could be carried out. And what were the little penalties attached to breaches of these regulations? It must be borne in mind that any water company if they thought fit, or if so required by the Board of Trade, could arbitrarily alter any of these regulations, or make new regulations. He would ask whether this did not iuvolve a nice little interference with the insides of houses? Every occupier on receipt of two months notice must positively alter all his fittings, or have the water suppliers come in and do it for him; and if, after being done, any occupier allowed his fittings to get out of order, he was liable to a £5 penalty, while the absence of the prescribed fittings in a house constituted a nuisance under the Nuisances Removal Act. It surely must be apparent, therefore, that the introduction of the so-called constant service in London was by no means an unmixed good. He regretted having to enter upon these matters, but he had been compelled to do so because the report, if adopted, pledged the Board to carry out the system. Under all the circumstances, he thought the report should go back to the committee for further consideration.

Mr. MUNRO seconded the amendment. He was not opposed to the recommendation in the report, but he thought as yet the Committee had not given proper consideration to the question. He believed they would all agree that the control of the water supply should be in the hands of a central authority, and for the East-end of London, he could say that the public had been long enough tyrannized over by a body of directors whose chief object was to make their receipts and dividends as large as possible, while they made their supply of water as small as possible. At the same time, he thought the Board should not hurriedly come to a conclusion on so important a question as that submitted by the committee, and he hoped before they came to a decision there would be reports on the subject before them both from the engineer and the accountant.

Mr. FREEMAN said he was much obliged to the last speaker. The speech which he had made was decidedly in favour of the proposition of the committee, because he had shown very clearly the great injustice under which the public now suffered. The sooner that injustice was put an end to the better. He was quite with those who wished to consider the matter fully, and agreed that the Bill should be made a good one. What was the best mode of considering the matter? If they went on debating it at the Board they would never get anything definite; what they should do was to prepare the Bill at once, and then discuss that Bill clause by clause, with the information obtainable from their officers and from other sources at their command. When they had fully matured their scheme they would have something tangible and practicable to take up to the Home Secretary. He could not agree with Mr. Richardson, who seemed to think that if the question hereafter went to arbitration the arbitrator would take into consideration, in valuing the property of the companies, that the Board might have to go to new sources of supply, and thus have two capitals to pay upon. The arbitrator would take into account the actual incomes of the companies, and make his award thereon at 25 or 30 years purchase. For his own part, he (Mr. Freeman) wanted to avoid that state of things, and, therefore, he desired that the business should be done in such a manner as would be fair to all parties.

Mr. CUFFLIN said the time for discussing the details of the scheme would be when the Bill was prepared and brought before them. He did not agree with those who thought that this matter was being unduly hurried forward. It had been before the Board and the public of the Metropolis for a great many years, and they had all arrived at the conclusion that the supply of water ought no longer to remain in the hands of the companies. It was time the Board adopted some resolution on the question. With reference to the regulations in connexion with a constant supply, the best answer that could be given was that if the resolution was carried, and the Bill passed, the matter would be in the hands of the Board to adopt what regulations they pleased. He was not a professed economist, but he confessed he was not at all frightened at the large sum of money which the transfer of the water-works to the Board would require. He rather regretted that they would have to buy up some of the worthless plant and impure sources of supply belonging to the companies, but he looked upon that as a necessity, and as a sort of compensation to those who had hitherto come forward to meet the wants of the inhabitants of the Metropolis. Supposing it did cost £20,000,000, he thought the Board would have a good return for their investment, and rather than not carry out the scheme he would give twice £20,000,000, because he felt convinced that the supply should be in the hands of the authorities. Some people would say that in buying the companies they would buy an impure source of supply. But supposing they did not buy up the companies, would it not still be their duty to say that the present source of supply—the Thames—was impure, and to compel the companies to go to a different source? And if they did so, who would have to pay for it? Why, however extravagantly the companies set about the work, the consumers of the Metropolis would have to pay the expense. Surely, then, it would be better that the matter should be in the hands of the Board. He was certain that some one would have to take up the question as representing the consumers, and he thought it was quite time for the Board to step forward in their interests and say, "We agree with you; you have good reason to complain, and we are ready to take upon ourselves that which will be for your interest and benefit." In taking such a step he was satisfied that the Board would receive every support.

Mr. RUNTZ said this question occupied the attention of the Board seven years ago, and at that time all were agreed it was not right that the supply of a necessary of life like water should be in the hands of a body whose first consideration was profit, but that it should be under the management of those who represented the interests of the inhabitants at large. If upon that point they were all agreed, why, then, was it not in the hands of this Board? Because the Legislature had said they must wait until the new government of London was organized. Seven years had passed away; several persons had endeavoured to tinker up the municipal government of the Metropolis, but none had succeeded. If Londoners had to wait for a reform in their water supply arrangements until the government of the Metropolis was remodelled, they would have to wait for another generation to pass away. It was his own deliberate opinion that the supply of water should be in the hands of a disinterested public body; but then he thought also that the Board, in proposing to take up the matter, should fully satisfy themselves that what they were about to do was really for the benefit of those they desired to serve. While prepared to vote for the resolution now before them, it must be on the distinct understanding that they did not pledge themselves to bring in a Bill. It might be true in the abstract that it was right to have a necessary of life like water in the hands of the municipal authority, yet from the peculiar circumstances of London it might turn out that, in this special case, it might not be for the benefit of the ratepayers, and until the Board had satisfied themselves upon that point, he for one was not prepared to pledge himself to the promotion of a Bill in Parliament. They required to make further inquiries, and, therefore, he considered that all they were doing that day was assenting to a reference to the Committee to examine the question in all its bearings, and only if they should come to the conclusion that it would be to the advantage of the ratepayers, should they report in favour of the introduction of a Bill to acquire the undertakings of the companies. He hoped that if, as the result of further inquiry, they should not arrive at that conclusion, they would be bold enough to come back to the Board and say that the present circumstances were not favourable to such a proceeding as was recommended in the report now before them. Speaking of the quality of the present supply of water to London, he said he had received a copy of a paper submitted by Dr. Tidy to the Society of Medical Officers of Health upon "The Composition and Character of the Water supplied to London during 1876." As he presumed every other member of the Board had seen this paper, he would only call attention to the last paragraph, in which Dr. Tidy remarked—

"Lastly, I am of opinion that my analyses prove that London enjoys a water supply of very considerable purity, and I am further convinced that, from a medical point of view, no substantial objection can be urged against its wholesomeness for dietetic and culinary purposes."

Now, if this was true, one very important reason which had been urged for the interference of the Board was taken away, and it might be possible that, under all the circumstances of the case, the Board would not be able to show that interference on their part would be to the advantage of the consumers. He quite assented to the proposition in the abstract, that the supply should be in the hands of the local authorities; but then London was not like an ordinary city, it was a province. Things had grown up in the Metropolis which ought never to have grown up at all, but the Board must deal with matters as they found them, with all their surrounding circumstances, and not as though all things were entirely new. He believed they would be able to show that the course now proposed was in the interests of the public, but until this was incontestably proved he was not disposed to vote in favour of taking up the question as recommended by the committee.

Mr. LLOYD said a small portion of the district which he represented (Lewisham) had been under constant supply for some time, and he was bound, in justice to the water company by whom it was furnished (the Kent Company), to state that, in consequence of their not insisting upon all the stringent regulations referred, to the supply had been ample, the expense moderate, all parties being satisfied. What could be done in one place could be done in all.

Mr. LEGG said he was disposed, to a certain extent, to agree in the recommendations of the committee, that it would be better that the whole or a portion of the water supply of the Metropolis should be in the hands of a responsible body. But he could not agree in that portion of the report which said the time had now arrived for promoting a Bill in Parliament. Surely the Board had enough Bills in Parliament already, and he thought if they asked for another they would defeat their own object. He was disposed also to think that the origination of a measure for transferring the water-works from the companies to the public authority should not be with the Board, but with the Government of the country, although the Board might intimate their willingness to carry out such a measure if Parliament would sanction it. He altogether differed with the chairman of the committee, who said if the supply were in the hands of the Board it could be furnished at a less cost than by the companies. He did not believe it would, nor did he think the quality of the supply would be improved. The emulation which existed between the companies to furnish the purest supply, at the least possible cost, would not exist when the transfer of their works was made to the Board. Considering, as he did, that the Board had not sufficient materials before them at present to justify them in coming to a decision on this important question, he would vote that the matter go back to the committee for reconsideration.

Mr. H. L. TAYLOR said it appeared to him that the Board were not pursuing a right course, and that they would be losing much time in the end if they should come to a resolution without some prior information on the subject. He was not averse to the Board entertaining so large a question, but when the committee recommended that they should be authorized to prepare a Bill containing certain clauses, and should then see the Home Secretary about it, it seemed to him that they were putting the cart before the horse. It occurred to his mind that if they desired to succeed without incurring any large expenditure or loss of time, the proper course would be to see the Home Secretary in the first instance; and that at the present time it would be sufficient for the Board to pass a declaratory resolution to the effect that they were willing to take charge of the management of the supply of water to the Metropolis, and that in the event of obtaining the support of the Government they would be prepared to submit a Bill to Parliament. It was most desirable to obtain the views of the Home Secretary on the question, for they certainly would not succeed without Government support. It was always advisable that a public body, desirous of discharging a public duty, should, if possible, act in accord with the Government of the day. He would go further than Sir W. Codrington, and not merely refer the question back to the committee. If Sir William's amendment was negatived, he would propose a second amendment to this effect—"That the report be printed, and that the further consideration of the question be adjourned until the committee

have had the opportunity of ascertaining the views of the Home Secretary as to the support which the Government would be disposed to give to the measure under consideration, and that it be referred back to the committee to confer with the Home Secretary on the subject." This was not the time for going into details, but he might say there was a much larger question involved in this matter than was supposed. The chairman of the committee said he calculated upon the support of the Corporation. Now the matter had been considered by a committee of the Corporation, and they felt that there were difficulties surrounding it. It had not been before the Common Council, but of course it was a question in which the City of London was concerned as well as the rest of the Metropolis, and no doubt, in whatever was deemed the best course to be pursued, the Board would have the support of the Corporation. There had been assertions made as to the cheapness with which water could be sold if the supply got into the hands of the authorities; but that was only a surmise, though probably it was correct to suppose the public would not then have to pay so much as while in the hands of companies, who had dividends to make for their shareholders. If they were beginning *de novo*, there would probably be nothing better than for a public body like this to undertake the water supply; but he apprehended that, with all his research, the chairman of the committee could not find an instance of a municipality initiating a supply. It was said that in Manchester and other large towns the supply was in the hands of the authorities, but in those cases it had been brought about by the corporations buying up the companies, and not by instituting the supply themselves. It seemed now to be considered that it was the duty of the municipal bodies to take the supply of water into their own hands, instead of leaving it in the hands of companies to make a profit by it; but whether Parliament would accept a proposal, that old companies, some of whom had been established for centuries, should be bought up in the way proposed, must be left for it to determine. Something had been said about the quality of the London water. Now, Dr. Tidy seemed to have gone very fully into that question, and he had given a minute description of the quality of that supplied by the companies; and certainly if his conclusions were correct, the water was much better than he (Mr. Taylor) had supposed it to be. It appeared from the report that the Kent water, which was drawn from the chalk, was the purest of all, and he could not help thinking that better sources of supply than the Thames might be found by the other companies.

Mr. FELL feared that, whether the motion or the amendment was carried, a large amount of expenditure would be incurred. To go to the Home Secretary before preparing a Bill, embodying the proposed scheme of the Board, to lay before him, would be a great mistake.

Mr. LESLIE said he very much approved of all the Board had done during the last seven years in connexion with this subject, and on this ground, that they had only talked, which had cost the ratepayers nothing. But now they were going to begin to put their hands into the ratepayers pockets, which was a different matter. The chairman of the committee had told the Board something about the Royal Commission of 1869, but he had not told them all. He had left out the most important part of their report—purposely left it out, for he could not have missed it—it stood staring him in the face. It was as follows:—"*Summary of Conclusions and Recommendations.* We are of opinion that Mr. Bateman's scheme is, in an engineering point of view, feasible and practicable, and that by it a large supply of water might be obtained for the Metropolis; but that experience warrants great caution in judging of the sufficiency of a gravitation scheme of such magnitude." Turning back to Mr. Bateman's scheme, he found that it was not proposed by him to go to the Thames for a water supply. "First on the list (said the Commissioners) is that of Mr. J. F. Bateman, F.R.S., C.E., who has constructed some of the largest works in the kingdom. The plan proposed by this gentleman for supplying the Metropolis was first published by him in a pamphlet bearing date November, 1865." Well, now he proposed to collect the water in reservoirs to be formed in the mountainous districts of North Wales. Why did not the honourable member mention that? He forgot it; but that was the conclusion of the Commission. But Mr. Richardson knew it, for he said as to going out of the London district it was all rodomontade, as most of his speeches were. Now he (Mr. Leslie) objected to the Board going any further in this matter in the way proposed. He insisted, the last time the question was before them, that in a thing of this magnitude they ought, first of all, to go to the Government and know whether they would support them in any measure proposed. They ought also to go to their constituents, the vestries, and ask them whether they approved. Dr. Tidy's paper indicated that the Kent Water Company's supply was the best, and Major Bolton, who had just reported to the Government, said the West Middlesex water was the best in London. Now the West Middlesex Company drew the whole of their supply from the Thames, but then they had a peculiar mode of filtration, which seemed to have answered up to Major Bolton's idea of purity. With reference to the course proposed to be adopted by the Board, they were just going on in the old way. Here was a solicitor moving in the matter—it seemed there was "nothing like leather," and soon they would have Mr. Cripps, Q.C., and Mr. O'Hara, and the Lord knows who, called in to help the committee in drawing up a Bill. Now this was just what was done in reference to the gas question, and a most tremendous mess they made of it. The gas companies beat the Board hollow, and the Board hadn't a chance with them. Nor would they have a chance with the water-companies when the directors of railway companies, gas companies, and water companies confronted them in the House of Commons. If ever their Bill got there, the Lord have mercy upon the ratepayers. His advice to the Board was to let the companies alone until the Government themselves moved in the matter. At the present moment the Board did not know enough to be in a position to act, and their duty clearly was to go to the Home Secretary and ask whether he considered the Board was a proper body to be entrusted with so large a question, in addition to the immense quantity of work they already had on hand, and which required them to sit almost every day.

Mr. ROCHE replied. He said there was nothing in the proposal which he submitted that pledged the committee to prepare a Bill and have every clause ready before going to the Home Secretary. It was perfectly competent for the committee to go to the Government at any time, but they should not do so until they had something tangible to go with. It was their duty to express their opinion independently of the Government, and if they were not fit to do so, they were not fit to be the governing body of the Metropolis. On the question of finance, although he had not gone into the subject in introducing the report, he was not acting on any surmise. The committee had had before them full figures from the accountant, but it was not considered wise to discuss them at the Board. But upon that point he reminded them that in the report of the Royal Commissioners it was stated that at one time the undertakings of the companies might have been purchased for five millions, and at the time the report was made they could have been obtained for twelve millions. It was certain they must be purchased at some time or other, and the longer the matter was delayed the larger would be the amount to be paid.

The amendment was then put and negatived, and a division being demanded there appeared—

For the amendment	9
Against it	27
Majority against	18

Mr. H. L. TAYLOR said he would not now ask the Board to approve the amendment which he shadowed forth in his speech, but would move that the following words be added to the original motion:—"But that before taking any action the Works and General Purposes Committee do seek a conference with the Home Secretary on the subject."

Mr. WATKINS seconded the amendment, which was put and negatived.

The motion for the adoption of the committee's report was carried, on a division, by 26 to 6.

THE COMPOSITION AND CHARACTER OF THE WATER SUPPLIED TO LONDON DURING 1876,

BEING A REPORT SUBMITTED TO THE SOCIETY OF MEDICAL OFFICERS OF HEALTH.

By CHARLES MEYMOTT TIDY, M.B., F.C.S., &c.

Gentlemen,—On the death of my colleague, Dr. Letheby, I undertook, at your request, to continue the monthly analyses of the London waters, and it is now my duty to report generally on the several analyses I have submitted to you month by month during 1876. Let me say that these analyses are put forward with no other desire than to elucidate facts—certainly in no spirit of opposition, or with the view of sustaining preconceived opinions. I could most earnestly have wished that the suggestion of the Society, that the several samples examined by me should be duplicates of those submitted to Dr. Frankland, could have been carried into effect; it is only right, therefore, inasmuch as the Society left this matter in my hands, that I should say it was no fault of mine that objection was taken to the proposal. I have, under the circumstances, thought it advisable to collect the samples myself every month from the various stand-pipes supplied by the several companies, without the companies having any knowledge of the day when, or time at which, the collection is made. In this way, I have secured, as far as possible, a fair sample of the water for analysis.

In the following table I have tabulated the averages of the analyses of the samples of water thus taken from stand-pipes supplied by the several companies during the past year.

Average Composition and Quality of the Metropolitan Waters during the Year 1876.

The quantities of the several constituents are stated in grains, and calculated in 70,000 grains of water, or one imperial gallon.	Ammonia.		Nitrogen as Nitrates, &c.	Oxygen used to Oxidize Organic Matter.	Total Solids.	Lime.	Magnesia.	Chlorine.	Sulphuric Anhydride.	Hardness on Clark's Scale.	
	Saline.	Organic.								Before Boiling.	After Boiling.
Thames Water Companies.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Grains.	Degrees.	Degrees.
Grand Junction	0·000	0·006	0·130	0·066	20·026	7·825	0·450	0·989	1·501	13·98	3·25
West Middlesex	0·001	0·007	0·131	0·058	19·881	8·330	0·459	0·958	1·471	14·0	3·1
Southwark and Vauxhall	0·001	0·007	0·122	0·065	19·716	8·176	0·468	0·944	1·432	14·23	3·15
Chelsea	0·001	0·007	0·126	0·070	19·701	8·063	0·477	1·194	1·526	13·96	3·22
Lambeth	0·001	0·006	0·132	0·064	20·033	8·037	0·461	1·012	1·564	14·13	3·22
Other Companies.											
Kent	0·000	0·002	0·287	0·008	27·201	10·278	0·738	1·386	2·824	19·38	5·12
New River	0·000	0·004	0·134	0·035	19·435	7·896	0·423	0·918	1·059	14·18	3·11
East London	0·001	0·005	0·129	0·042	20·439	8·348	0·529	1·086	1·599	14·5	3·28

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

GRAND JUNCTION.—The *total solid* matter, obtained by evaporation to dryness, ranged from 17·02 grains per gallon in September, to 22·53 grains in January; the *nitrogen* as *nitrates*, from 0·090 grain in July, to 0·172 grain in February. The *minimum* amount of oxygen needed to oxidize the organic and other matters per gallon, was in September 0·032 grain, and the *maximum* in December 0·128 grain.

The samples collected in January, February, March, April, May, July, September, and December, contained a slight trace of suspended matter. In the other months the water was clear.

WEST MIDDLESEX.—The *total solid* matter ranged from 17·50 grains per gallon in August, to 22·61 grains in December; the *nitrogen* as *nitrates* from 0·090 grain in August, to 0·165 grain in November and December. The *minimum* amount of oxygen needed to oxidize the organic and other matters per gallon, was in June and September 0·032 grain, and the *maximum* in December 0·1 grain.

The samples collected in May, August, and September, contained a slight trace of matter in suspension. In the other months the water was clear.

SOUTHWARK AND VAUXHALL.—The *total solid* matter ranged from 17·60 grains per gallon in August, to 22·23 grains in January; the *nitrogen* as *nitrates* from 0·098 grain in September, to 0·170 grain in February. The *minimum* amount of oxygen needed to oxidize the organic and other matters per gallon, was in August 0·039 grain, and the *maximum* in December 0·114 grain.

The samples collected in January, February, April, May, August, October, and December, contained a trace of suspended matter. In the other months the water was clear.

CHELSEA.—The *total solid* matter ranged from 18·0 grains in September, to 22·07 grains in January; the *nitrogen* as *nitrates* from 0·075 grain in April, to 0·168 grain in October. The *minimum* amount of oxygen needed

to oxidize the organic and other matter per gallon, was in September 0·035 grain, and the *maximum* in December 0·132 grain.

The samples collected in January, February, March, April, May, November, and December, contained a trace of suspended matters. In the other months the water was clear.

LAMBETH.—The *total solid* matter ranged from 18·90 grains per gallon in August, to 22·13 grains in February; the *nitrogen* as *nitrates* from 0·102 grain in August, to 0·180 grain in November. The *minimum* amount of oxygen needed to oxidize the organic and other matters per gallon, was in November 0·038 grain, and the *maximum* in December 0·110 grain.

The samples collected in April, May, July, November, and December, contained a trace of suspended matter. In the other months the water was clear.

KENT.—The *total solid* matter ranged from 24·24 grains per gallon in October, to 28·3 grains in June; the *nitrogen* as *nitrates* from 0·180 grain in August, to 0·409 grain in February. The *minimum* amount of oxygen needed to oxidize the organic and other matters per gallon, was in April and September 0·003 grain, and the *maximum* in November 0·014 grain.

The samples were uniformly bright and clear.

NEW RIVER.—The *total solid* matter ranged from 16·43 grains per gallon in September, to 21·60 grains in February; the *nitrogen* as *nitrates* from 0·088 grain in September, to 0·174 grain in February.

The *minimum* amount of oxygen needed to oxidize the organic and other matters per gallon, was in November 0·014 grain, and the *maximum* in December 0·092 grain.

The samples were, without exception, bright and clear.

EAST LONDON.—The *total solid* matter ranged from 16·22 grains per gallon in September, to 23·21 grains in December; the *nitrogen* as *nitrates* from 0·090 grain in August, to 0·192 grain in March. The *minimum* amount of oxygen needed to oxidize the organic and other matters per gallon, was in June 0·024 grain, and the *maximum* in January 0·056 grain.

The samples collected in July and December, contained a trace of suspended matter. In the other months the water was perfectly clear.

Respecting the *occasional turbidity*, I would note that the presence of matters in suspension is determined by examining a body of the water in a glass tube 2 feet in length. The suspended matter is, in the main, finely divided clay, and occasionally a few filaments of fungoid or confervoid growths are also present. It has always been in far too small a quantity to estimate, and its removal may be effected by subsidence and filtration. Its effect on the appearance of the water is that of a slight dimness, never amounting to opacity.

Of the *total solid* matter, I would remark, that about 8 grains is lime, and 0·5 grains magnesia in the water derived from the Thames, Lea, and New River; and about 10 grains is lime and 0·75 grain magnesia in the water, pumped from the deep chalk wells, supplied by the Kent Company. The existence of lime and magnesian salts in water used for drinking purposes, regarding it from a sanitary and dietetic standpoint, is, I consider, not merely not unwholesome, but of great advantage and importance. The truth of this observation is fully confirmed by the returns of the Registrar-General.

The quantity of *ammonia* present has been uniformly small; it has never exceeded 0·002 of a grain per gallon, and very often (more especially in the waters of the Kent, New River, and Grand Junction Companies) has been entirely absent.

I place before you, in a tabular diagram, *the quantity of oxygen* needed month by month *to oxidize the oxidizable matters* as estimated by a standard potassic permanganate solution acting for three hours. Without placing a too exalted value on the test (for I am well aware that all qualitative methods are on principal liable to be objected to), I would point out the uniformity of the results obtained by it. On this matter I purpose speaking on another occasion at greater length, with the object of showing that a general conformity of the results obtainable by this process and by quantitative analysis really exists.

The following table exhibits the quantity of water supplied daily to the Metropolis:—

Average Daily Supply to the Metropolis during 1876.

1876.	Gallons per Diem.	Houses Supplied.	Gallons per Head daily including Waste.
January	112,034,444	523,487	32·5
February	110,394,788	523,801	32·4
March.	110,441,128	524,183	29·4
April	114,316,265	524,669	30·4
May	121,146,297	525,183	32·3
June	123,192,994	525,841	32·8
July	137,135,102	526,577	36·3
August	134,139,552	527,321	35·7
September . . .	121,622,500	527,949	32·3
October	117,228,394	529,022	31·2
November . . .	112,638,531	530,030	30·0
December . . .	110,454,197	530,299	29·4
Average . .	118,728,681	526,530	32·0

Note.—It is believed these quantities are given upon the gross capacities of the pumps, and that they are consequently subject to a deduction of about 10 per cent. to arrive at the net quantities,

It will be seen that the proportion supplied for each individual has been on an average 32 gallons per day. The *minimum* supply was in March, 110,441,128 gallons, and the *maximum* in July, 137,135,102 gallons. One fact is patent—that the waste of water at the present time is very great, inasmuch as that the quantity delivered on the intermittent system, still in use in London, is largely in excess of the quantity delivered in large provincial cities in which the system of constant service obtains. About one-half the supply was derived from the Thames, one-third from the Lea and New River, and the rest from deep chalk wells.

Lastly, I am of opinion that my analyses prove that London enjoys a water supply of very considerable purity; and I am further convinced that, from a medical point of view, no substantial objection can be urged against its wholesomeness for dietetic and culinary purposes.

I am, your obedient servant,

C. MEYMOTT TIDY, M.B.

48, *Queen Anne Street, Cavendish Square, W., Feb.*, 1877.

To the President, Council, and Members of the Society of Medical Officers of Health.

UNITED GENERAL GASLIGHT COMPANY.—A special meeting of this company was held at the offices, Jeffrey Square, London, on the 20th inst.—Mr. R. Hudson in the chair—when it was unanimously resolved—"That the Bill now submitted to this meeting, intituled 'A Bill to dissolve the United General Gaslight Company, and to re-incorporate the members thereof with further powers for the supply of gas at Limerick and for other purposes' be approved and consented to, subject to such additions, alterations, and variations as the directors may approve and Parliament may think fit to make therein."

MANCHESTER CORPORATION WATER-WORKS.

At the Meeting of the Manchester City Council on the 8th inst., the Annual Report of the Water-Works Committee was presented.

The committee recommended the council to make and order a public water-rate of 3d. in the pound, and a domestic water-rate of 9d. in the pound, to be made and levied on all property assessed thereto, for the purpose of raising the amount required for the payment of the expenses connected with the supply of water within the city during the year commencing on the 1st day of January, 1877.

The report went on to say:—

The amount of estimated available rates outstanding on the 30th of December last, out of a gross sum of £48,303 15s. 3d., was £52 11s. 9d.; and of rentals, £57 3s. 6d., out of a gross sum of £112,135 4s. 3d.; no arrears on account of rates or rentals for any previous year are outstanding.

Your committee continue to extend the supply of water by meter for trading purposes, being the mode of supply most equitable for all parties, and by which also great waste is prevented. The testing and stamping of water-fittings continues to progress satisfactorily. During the year 47,568 water-fittings have been examined and tested, of which 45,487 have been passed and stamped, and, on inspection, the whole of such fittings have been subsequently proved to have successfully stood the pressure of water. During the year the internal water-fittings in 38,137 houses, warehouses, and other premises have been inspected, and waste therein prevented where necessary, by putting the fittings into proper repair, in accordance with the regulations of the corporation. 5100 cases of inspection of rates, and 5572 cases of rentals have been examined by the inspector and his assistants during the year, and have subsequently been dealt with by the Sale and Supply Sub-Committee. During the year upwards of 5 miles of new iron piping have been laid in place of old piping, on renewals account. Upwards of 11 miles of iron piping have been laid in extensions in various townships during the past year, and your committee have made connexions to 6745 additional houses and other premises by means of upwards of 5¼ miles of lead piping, at an expense of £1475 3s. 7d. During the year the full quantity required by the Act of Parliament has been delivered to the millowners on the river Etherow, and a continuous and uninterrupted supply has been provided for all purposes within the district supplied by the corporation.

During the past year your committee have again paid out of revenue the whole of the interest accruing upon the further cost incurred for the new works being executed in the Valley of Longdendale, and also the expenditure which has been incurred in the works at Woodhead reservoir. Your committee have again set apart a sum in the revenue account for the renewal of old mains and service-mains for the present year.

The works of the new embankment of Woodhead reservoir are now practically completed, and the water was held to top water-level for the first time on the 14th inst., it having been for some two or three weeks previously within about 2 feet of that level. All the works are reported by the engineer to be quite satisfactory. Although the construction of the works of this reservoir began in Sept., 1848, it has never been filled with water till the present month, owing to the character of the ground and the difficulties encountered in the construction of the first embankment. Very careful and prolonged investigations enabled Mr. Bateman to recommend the site upon which the new embankment has been constructed, and on this site the foundation of the main puddle wall is 160 feet below top bank level. The new embankment, with the discharge tunnel and works connected with it, have occupied about eight years, and are of a most substantial character. The difficulties attending the formation of an embankment of this height, in such a situation, have required the greatest care and consideration. Much additional work has been executed this year, involving considerable extra expenditure in connexion with this reservoir, such as the reconstruction and arrangement of the tunnel at the head of the spring watercourse; the repairing and grouting of the old waste weir below the embankment, which has now come into use for the first time; the pitching and beaching of the slopes of the reservoir where the rise in the water was cutting away the ground and endangering the watercourse round the reservoir, and other smaller matters. It was, however, considered desirable and more economical to do this work before the removal of the plant. The banks of the reservoir will occasionally, and for some time to come, require protecting by pitching.

The Bottoms reservoir has been in full use during the past year, and has been repeatedly at top level, and for considerable periods. Some of the work on the arm puddle on the Derbyshire side of the valley, and on the end of the embankment, still remains to be done. The character of the work has prevented it being pushed forward with greater speed. All the masonry in connexion with the waste weir and flood watercourse at this embankment is now finished, and the temporary timber troughs have been removed.

The lining of the Tintwistle tunnel is completed, and the inlet masonry for the sluices at its commencement on the Hollingworth Brook is now in progress, and will be completed during the spring.

The gauge basin at Godley reservoir has been cleansed during the past year, and all the masonry—both here and at the straining well on the embankment—examined and repaired.

The road diversion in connexion with the Denton extensions has been let to Messrs. Worthington, and the works of the sewer for the diversion of the foul water from the Gorton reservoirs, intended to be executed by the corporation, will shortly be commenced; plant set at liberty by the completion of various works in Longdendale is now being delivered on the ground.

The cleansing of Lower Gorton reservoir and the stone beaching of its slopes have been completed, and the water was again supplied to the city from this reservoir in June, 1876.

Upper Gorton reservoir cannot be used for the storeage of water from Longdendale until the foul drainage can be diverted by the new sewer. The work of cleansing and stone-beaching is, however, well advanced, and will be arranged to be finished by the time the new sewer is ready.

On the motion of Alderman GRAVE, a resolution was adopted imposing a water-rate as recommended by the committee.

WARRINGTON GAS-WORKS PURCHASE.—An action for assult arising out of the recent gas agitation in Warrington was tried before the County Court judge in that town, on Thursday last, and excited a large amount of interest. The plaintiff, Mr. Lea, the secretary of the Opposition to Purchase Committee, sought to recover from Mr. John Davies, the son of Alderman Davies, the sum of £50 as damages and compensation for injuries received through an assault of which the defendant had been guilty. The hearing of the case occupied six hours, but the short facts were that, at a meeting in the Temperance Mission Room, on the 12th ult., to oppose the Town Council, there was a great row, and the defendant, believing that plaintiff had called his father a liar, retaliated by applying the same epithet with a profane embellishment to the plaintiff himself; thereupon a scuffle ensued, and plaintiff's coat was torn, and, as he alleged, he received a severe blow. In the result, the jury awarded the plaintiff one farthing damages.

BIRMINGHAM CORPORATION GAS-WORKS.

On Tuesday, Feb. 20, a Meeting of the Birmingham Town Council was held—the MAYOR (Alderman Baker) in the chair.

The report of the Gas Committe was read. It stated that a contract had been entered into with Messrs. Hilton and Co. for the construction of a tank at Windsor Street, for the sum of £22,000. The cost of new mains and all charges in laying the same were charged to capital, and the labour in taking up old mains and cost of relaying old mains elsewhere were charged to revenue, as were also all side connexions to new mains. The material of old mains relaid was debited neither to capital nor revenue. When old mains were taken up and put into stock at the works, they were never valued in stock-taking. The sum of £6278 10s. 3d. had been carried to the debit of capital account for distribution, for the year ending Dec. 31, 1876, and £18,219 13s. had been charged to revenue, which included the cost of re-arrangement of mains, estimated at about £8000. When any of the apparatus on the works was enlarged, the value of the enlargement was charged to capital, but the cost of taking down and re-erecting the old portion of the apparatus was charged to the revenue. The entire cost of any of the apparatus, which was wholly renewed, was debited to revenue, and revenue credited with any amount realized by the sale of the old materials. The gas sold for the year ending Dec. 31 was 2,655,517,000 feet, compared with 2,576,644,000 in 1875, showing an increase of 78,873,000, equal to 2·97 per cent. The average quality of the gas, as certified by the official tester, since last report, was 17·57 candles, being 2·57 candles in excess of the parliamentary standard. The committee hoped to be able to carry £25,000 to the credit of the improvement rate, as the result of trading for the year 1877. A memorial, signed by 179 persons, had been received from the inhabitants of Sutton Coldfield, applying for an extension of the mains, and as the mains were already in the parish, the committee had decided to make the extension, at a cost of about £6000. With reference to the Acts of Parliament obtained by the local authorities of Smethwick, Oldbury, Tipton, and West Bromwich, the committee reported that notice had been given to each of the local and sanitary authorities within the limits of the corporation gas supply, of the intention of the holding of the arbitration provided for by section 40 of the Birmingham Corporation Gas Act. The first meeting of the arbitrators would be held on the 17th of March in the Council Chamber. A resolution had been received from the Balsall Heath Local Board, stating that they did not intend to promote a Bill for the purchase of the mains in their district. The committee had obtained, for £750, the lease of the house and land belonging to Mr. Sharp, of Nechells Place, in consequence of a claim for compensation having been made, through the property being affected by excavations in connexion with the construction of the new tank at Nechells. With a view to the more effectual insurance of the buildings at the various works, an arrangement had been made with the Imperial and County Fire Offices to insure for the sum of £27,300 on favourable terms, considerably under the rate paid by the late gas companies. The number of new services supplied during the quarter ending the 31st of December was 1092, the total number for the year being 2881. The committee recommended the council to comply with the request from the churchwardens of St. Martin's, and the clockwardens of St. Paul's, for a free supply of gas to the illuminated clocks in the towers of the two churches. The estimated cost at St Martin's would be about £20, and at St. Paul's £10 per annum. The balance-sheet and accounts for the year had been audited, and showed a net profit for the year of £34,122 5s. 7d., which was exclusive of £4000 carried to depreciation-fund account; and the amount of sinking-fund, for redemption of loans and annuities, was £3832 11s. 6d.; £25,000 was paid over to the borough treasurer on June 29, 1876. The further sum of £5000 would be paid to him in accordance with the revised estimate approved at the last meeting of the council, leaving £4122 5s. 7d., which the committee proposed to carry to the reserve-fund account, making that fund £28,511 2s. 2d. The committee believed that the council, taking into consideration the bad state of trade in Birmingham and the district, would consider this a not unsatisfactory result.

The balance-sheet for the past year, submitted with the report of the committee, was as follows:—

STATEMENT OF ACCOUNTS OF THE GAS DEPARTMENT FOR THE YEAR ENDED DEC. 31, 1876.

A.—STATEMENT OF LOAN CAPITAL.

Description of Loan. (Mortgage, Bond, Debenture Stock, &c.)	Rate per Cent. of Interest.	Total Amounts borrowed at Dec. 31, 1876.	Remaining to be Borrowed.	Total Amount Authorized.
Mortgages	4½	£16,800 0 0	£168,651 0 0	£2,000,000 (calculating the annuities at 20 years purchase; at 25 years purchase the amount would be £2,281,337 5s.)
	4¼	1,100 0 0		
	4	544,650 0 0		
	3½	29,250 0 0		
	3¼	25,550 0 0		
	3	40,000 0 0		
Debenture stock	4	48,650 0 0		
Annuities (capitalized at 25 years purchase)	..	1,406,686 5 0		

B.—CAPITAL ACCOUNT.

Dr.

	Expenditure to Dec. 31, 1875. £ s. d.	Expended this Year. £ s. d.	Total to Dec. 31, 1876. £ s. d.
To Expenditure to Dec. 31, 1875	2,000,931 3 0	..	2,000,931 3 0
Since that date—			
Lands acquired, including law charges	..	45,337 9 1	..
New buildings, manufacturing plant, machines, storeage works, and other structures connected with manufacture	..	51,171 13 5	..
New mains and service-pipes (not being in place of old ones), including laying same, paving, and other works connected with distribution	..	6,278 10 3	..
New meters (not in place of old ones)	..	4,172 17 11	..
		106,960 10 8	
Less proceeds of land, buildings, &c., sold, and transfer to stock		23,361 6 0	83,599 4 8
Total expenditure			2,084,530 7 8
Balance of capital account			28,155 17 4
			2,112,686 5 0

Cr.

	Certified Receipts. Dec. 31, 1875. £ s. d.	Received during Year. £ s. d.	Total Receipts to Dec. 31, 1876. £ s. d.
By Debenture stock	48,650 0 0	..	48,650 0 0
Mortgage and bonds	569,625 0 0	87,725 0 0	657,350 0 0
Annuities (capitalized at 25 years purchase*)	1,457,250 0 0	..	1,406,686 5 0
			2,112,686 5 0

* Annuities of the value of £50,563 15s. have been extinguished during the year.

C.—REVENUE ACCOUNT.

	£ s. d.	£ s. d.
To Manufacture of gas—		
Coals, including carriage, unloading, and all other expenses of depositing same on works	211,598 17 2	
Purifying materials and wages	3,975 5 10	
Salaries of engineers, superintendents, and officers at works	2,628 3 4	
Wages at works	38,927 10 10	
Repairs and maintenance of works and plant (including renewal of retorts), machines, apparatus, tools, materials, and labour; less old materials sold	23,781 12 2	
		280,911 9 4
Distribution of gas—		
Salaries of chief inspector, inspectors, assistant inspectors, and clerks in light office	7,425 17 4	
Repairs, maintenance and renewal of mains and of service-pipes, including materials, laying and paving, and labour	18,219 13 0	
Repairing, renewing, and refixing meters	6,455 1 6	
		32,100 11 10
Public lamps—		
Lighting and repairing	..	3,268 8 7
Rents, rates, and taxes—		
Rents	749 2 6	
Rates and taxes	11,133 6 8	
		11,882 9 2
Management—		
Salaries of secretary, accountant, and clerks	1,620 15 2	
Collectors commissions and salaries	3,622 12 0	
Stationery and printing	841 18 4	
General establishment charges and incidentals	3,375 15 0	
Auditor	68 5 0	
		9,529 5 6
Law and parliamentary charges—		
Law	282 10 7	
Parliamentary (oppositions)	262 12 10	
		545 3 5
Depreciation-fund, for works on leasehold lands		4,000 0 0
Bad debts		3,804 11 7
Expenses on loans		205 3 0
Bank charges		75 15 5
Total expenditure		346,322 17 10
Balance carried to profit and loss account (D)		123,282 1 10
		£469,604 19 8

	Cubic Feet.	Per 1000 Cubic Feet.	£ s. d.	£ s. d.
By Sale of gas—				
Common gas	7,556,500	4s. 3d.	1,605 15 1	
Ditto	6,445,600	4s. 1d.	1,315 19 9	
Ditto	4,853,100	3s. 11d.	950 8 1	
Ditto	2,169,000	3s. 9d.	406 13 6	
Ditto	626,519,000	3s. 3d.	101,809 9 5	
Ditto	452,469,800	3s. 1d.	69,755 16 0	
Ditto	541,936,900	2s. 11d.	79,032 10 3	
Ditto	614,758,100	2s. 9d.	84,529 2 4	
Adjustment for stock, &c.			719 4 7	
Public lighting and under contracts			19,584 15 10	
			359,709 14 10	
Less discounts and adjustments			15,565 12 4	
				344,144 2 6
Residual products—				
Coke, less labour and cartage			70,790 4 5	
Breeze				
Tar			31,164 16 8	
Ammoniacal liquor			16,271 2 3	
Sundry residual products			455 17 7	
				118,682 0 11
Rents				1,411 5 0
Fittings				4,352 0 5
Discounts on purchases				1,004 18 10
Transfer fees				10 12 0
				£469,604 19 8

D.—PROFIT AND LOSS ACCOUNT.

Dr. *Cr.*

	£ s. d.	£ s. d.		£ s. d.
To Amount carried to reserve-fund account from profits	24,388 15 11		By Balance of net profit brought from last account	25,338 15 11
Amount voted to officers of the corporation by Council Minute 10,265	950 0 0		Balance brought from revenue account (C), being profit for the year to Dec. 31, 1876	123,282 1 10
		25,338 15 11		
Interest on temporary loans		3,425 12 1		
Interest on mortgages and bonds, accrued to Dec. 31, 1876		23,672 16 2		
Interest on debenture stock to Dec. 31, 1876		1,959 5 6		
Annuities		56,269 11 0		
Sinking-fund, for redemption of loans and annuities		3,832 11 6		
Balance, being net profit for the year		34,122 5 7		
		£148,620 17 9		£148,620 17 9

E.—RESERVE-FUND ACCOUNT.

To Amount of balance to be carried to next account	£24,388 15 11	By Balance brought from profit and loss account (D)	£24,388 15 11

F.—DEPRECIATION-FUND ACCOUNT.

To Amount of balance to be carried to next account	£4,000 0 0	By Amount brought from revenue account (C)	£4,000 0 0

G.—SINKING-FUND ACCOUNT.

To Amount of balance to be carried to next account	£3,832 11 6	By Amount brought from profit and loss account (D)	£3,832 11 6

H.—GENERAL BALANCE-SHEET.

	£ s. d.	£ s. d.		£ s. d.	£ s. d.
To Capital account—			By Coals, for stock on hand, Dec. 31, 1876	25,507 18 9	
Balance at credit thereof (Account B)	28,155 17 4		Coke and breeze	11,574 8 0	
Profit and loss account—			Tar and other products	1,215 2 0	
Balance at credit thereof (Account D)	34,122 5 7		Sundry stores	26,746 7 4	
Reserve-fund—					65,043 16 1
Balance at credit thereof (Account E)	24,388 15 11		Gas and fittings rental, balance of this account due to the corporation on Dec. 31, 1876, less deposits, prepayments, and reserve	139,863 13 7	
Depreciation-fund—			Coke and other residuals	16,002 16 10	
Balance at credit thereof (Account F)	4,000 0 0		Sundry accounts	348 8 3	
Sinking-fund—					156,214 18 8
Balance at credit thereof (Account G)	3,832 11 6		Amount paid to borough treasurer on account of borough improvement-fund	..	25,000 0 0
Interest accrued and unpaid on mortgages, bonds, and debenture stock, and other loans to Dec. 31, 1876	12,718 2 5				
Annuities payable Dec. 31, 1876	27,784 9 1				
Sundry tradesmen and others, for amounts due for coals, stores, &c., to Dec. 31, 1876	54,573 6 6				
Amount due to bankers, less cash in hand	56,683 6 5				
	£246,258 14 9				£246,258 14 9

Examined and found correct,

Feb. 16, 1877. HOWARD S. SMITH, Auditor.

I.—STATEMENT OF COALS, &c.

Description of Coal.	In Store, Dec. 31, 1875.	Received during Year.	Carbonized or Used during Year.	In Store, Dec. 31, 1876.
	Tons. Cwt.	Tons. Cwt.	Tons. Cwt.	Tons. Cwt.
Common	34,105 5	322,240 18	315,124 18	41,221 5
Cannel	1,744 5	4,733 8	5,864 4	613 9

J.—STATEMENT OF RESIDUAL PRODUCTS.

Description of Residual.	In Store, Dec. 31, 1875. Estimated.	Made during Year. Estimated.	Used in Manufacture during Year. Estimated.	Sold during Year.	In Store, Dec. 31, 1876.
Coke—common, chaldrons of 36 bushels	34,640	344,152	78,538	254,493	45,761
Breeze—ditto	2,196	22,437	5,988	14,281	4,364
Tar—gallons	82,740	3,315,387	1,041	3,316,886	80,200
Ammoniacal liquor—butts of 108 gallons	1,470	92,954	..	92,261	2,163

Mr. MARRIS, in the absence of Alderman Chamberlain, moved that the report be approved. In doing so, he said the amount of capital on Jan. 1, 1876, was £2,000,931 3s. They had added on lands purchased £45,337; they had expended for new buildings, manufacturing plant, machines, storeage, and other works, connected with the manufacture, £51,171; on new mains and service-pipes (not including renewals), £6278; and for new meters, £4172. They had sold land, buildings, &c., making a total, including a small sum transferred to expenditure, of £23,361, leaving the gross addition to capital during the year of £83,599, and making a total expenditure upon capital account, to the 31st of December last, of £2,084,530 7s. 8d. On the revenue account for manufacture they had paid for coals, £211,598 17s. 2d.; for purifying materials and for wages, £3975; salaries and wages at works, £41,555; repairs and maintenance of works, £23,781. For distribution of gas, the salaries of inspectors, &c., amounted to £7425; repairs, maintenance, and renewals of mains and service-pipes, £18,219; repairing and fixing of meters, £6455. On the management, the total establishment charges, including salaries of secretary, accountant, clerks, stationery, printing, and auditing, the sum was £9529. They had lost by bad debts £3804; they had received for the sale of gas, less discounts, £344,144; for coke and breeze, £70,790; for other residuals, £47,890. They had made a profit in the fittings department of £4352. The profit and loss account showed that the total gross profit on the trading of the year was £123,282 1s. 10d. Out of that sum they had paid for interest £85,327. They had set aside for depreciation-fund on the Fazeley Street works £4000; for sinking-fund for the redemption of loans and annuities, £3832 11s. 6d.; leaving a balance of net profit for the year of £34,122 5s. 7d. Of that they had already paid to the borough treasurer £25,000, and they would make a further payment to him of £5000, and they proposed to carry the balance of £4122 5s. 7d. to the reserve-fund account, making that fund £28,511 2s. 2d. In coming to a comparison, they would see that it was difficult to institute a perfectly rigid comparison between the expenditure of this year and the last, because one company's undertaking only came into their hands on the 1st of July, and the other on the 1st of September. The sale of gas for 1875 was £389,176, and for 1876, £359,709, showing a decrease in the amount received of £29,467. If the price had been the same as in 1875, the total amount received would have been increased by about £31,000. Of course, there had been a considerable increase in the consumption; but it was very much below what they expected, owing undoubtedly to the badness of trade and economy in the consumption. Therefore, instead of having to report an increase of 5 per cent., they had to be contented with 2·97 per cent. The amount received for coke was about £17,000 less than last year. The price for coke was considerably lower, and they had great difficulty in selling it. With regard to new works, he stated that at Windsor Street they had a tank for a new gasholder to hold 2 million cubic feet. The meter-shops had been extended, and a test gasholder erected for the meter inspector. A large mess-room had been provided for the accommodation of the stokers, and a new governor-house had been erected, and a new boiler fixed, while foundations had been laid for new purifiers. Ten retort-beds had been rebuilt so as to economize the working. A portion of the offices at Adderley Street had been converted into a residence for the superintendent, who formerly resided off the works. The committee hoped to be able to arrange for a railway siding from the London and North-Western Railway Company to Windsor Street, so as to get rid of the cost of haulage from the stations at Lawley Street and Vauxhall, and they hoped to save something like £4000 a year in the cost of haulage alone. The Nechells new works were an extension of the Saltley works, and there a new gasholder to hold 2 million cubic feet was in progress. At Saltley works proper, several new works had been arranged, and some important alterations and additions had been made. The retort-house commenced by the Staffordshire Company in the year 1873 had been greatly enlarged, and would, when complete, contain an addition of 648 mouthpieces, being an increase of more than 50 per cent. upon the present manufacturing power of these works. In connexion with the retort-house, a dock basin, 145 feet long and 25 feet wide, had been constructed, by which the expense of removing the coke into the boats would be greatly reduced. The committee hoped to have the greater part of this work completed for use next winter. They had sanctioned the purchase of a locomotive to reduce the haulage and shunting charges. Great improvements were being made in the present apparatus for revivifying the purifying materials, and hydraulic lifts were being erected for the purpose of reducing the manual labour. About one-half of this work had already been completed. The governor for regulating the pressure through the town had been replaced by a much larger one. Ample provision had been made for the future extension of the works, consisting of a purifying-house in one block, 235 feet long by 90 feet wide and 30 feet high with four purifiers, provided with hydraulic apparatus. Two tower scrubbers, condensers, and tar and liquor stores of ample capacity were also being provided. The whole of the foregoing works the committee hoped to have ready for next winter's requirements. No considerable works had been executed either at West Bromwich, Fazeley Street, or Adderley Street. The old gasholders in Gas Street would shortly be removed. With regard to redistribution, he might say it was a most anxious, difficult, and important matter, and it had taxed the works considerably during the year. In the greater number of the streets mains were laid down in a fearful and wonderful manner, and in some streets they had three and four, and, in one case, five courses

of mains laid down, and it was evident that if they were to escape great leakage they must bring those mains into something like an organized system. The re-arrangement of the mains had received great attention during the year, and had made considerable progress; 46,179 yards of various sizes had been taken up, of which 28,317 yards had been relaid, and about 18,000 yards of entirely new mains had been laid. The mileage of streets newly occupied during the year was about 12¾, and notwithstanding that, there had been a reduction of nearly 14½ miles, which the committee trusted would have the effect of greatly reducing the amount of leakage; 2521 new services had been laid on during the year, 5297 had been enlarged or repaired, and about 2137 services had been removed. The total number of meters received and repaired at the Windsor Street works had been 6571. The attention of the committee had been particularly directed to two or three points. They were anxious to produce gas at the lowest possible price, consistent with the utmost purity and the highest standard of illuminating power. They were fortunate in having made favourable contracts for coal—contracts which, upon the whole, had been fairly completed by the contractors; but it would be unwise to hazard a prediction for the future. The illuminating power averaged, during the latter half year of 1875, 15·76 candles, and for last year, 17·33; and this was his answer to the lamentations which they still, though not so often, heard as to the deplorable quality of the gas which the corporation supplied. To get that illuminating power they had had to use a considerable quantity of expensive coal, which left behind a very inferior coke, which they could hardly sell at all. Another fact was that they not only had to pay for making gas at that high standard, but the consumers burnt less in consequence; so that the better the article the less they required—a state of things unparalleled in any other manufacture. The difference between the illuminating power required by the Act, and the illuminating power obtained, amounted to a cost to them of £10,000, and they had given the consumers in the borough and the district at least £40,000. They had reduced the price of gas, as from the 1st of January last, 3d. per 1000 feet, and had given the public an article worth £10,000 more than that they previously had. Referring to the item of interest, he remarked that if the companies had raised additional capital they could have charged at least 7½ per cent., whereas the corporation had raised their money at 4 per cent. In the second place, the committee had considerably diminished the cost of management. On directors fees they had saved £1800; in the secretary's office, £1200; in general office expenditure, for clerks and collection, £3000; rent and taxes, £5000. They had considerable difficulty in so organizing the offices that things should go on pleasantly. Their bad debts proper were really only £2804, and a large proportion of that item was a legacy left them by their predecessors. Referring to the price of gas, he said he had a return showing the charges made in twenty-five large towns of the country. In eighteen instances of corporations from which he had returns, the highest charges to large consumers were at Macclesfield, Rochdale, and Salford, where the charge was 3s. 11d. The lowest charge, with one exception, amongst the eighteen towns, where the gas undertaking was under corporate management, was Birmingham, where it stood at 2s. 7½d. The exception of which he had spoken was Walsall, where the charge was 2s. 1d.; but, on referring to the Walsall balance-sheet, it was clear that the corporation had hardly anything to pay for interest, and there was the other fact that, being wise in their generation, they purchased their works at a favourable time. He submitted that, considering the outside districts—the inhabitants of which were good enough to burn the gas of the Birmingham Corporation—took no share in the risk of the enormous undertaking, and no part whatever in the management of it, and that they could have no claim to the saving effected by the amalgamation, they had no cause for complaint, but were treated on better terms than previously, and supplied at a lower price by nearly 7d. per 1000 feet than the thirty-eight large towns, the list of which he had before him. He could only hope that, when the day came for them to shake hands and wish them good-bye, the consumers in the outside districts would be able to produce 20-candle gas at something like 2s. 1d. per 1000. Speaking of the future prospects of the undertaking, he said that although they had lost a considerable sum by leakage during the various processes he had indicated, they hoped in the future to effect a very great saving on that account. They hoped, by means of machinery, to secure a saving in the working expenses, gradually to increase the sale of gas—if trade should improve—and there was every prospect that the profit from residuals would greatly increase, so that he confidently claimed the right to look forward to a brighter season. The corporation had a grand property, and its condition, arrangements, and working had not fallen below, but rather exceeded the estimate. They had a property now of something like 116 acres of freehold land of the most valuable kind—land which must increase in value. In conclusion, he called attention to the resolution moved in the council on the 13th of January, 1874, viz.—"That, in the opinion of this council, it is desirable that the manufacture, supply, and sale of gas in the borough should be under the control of the corporation." He thought the report which he had just presented would cause the council to feel that they had acted wisely in passing that resolution. He would allude to one statement made on that occasion by Alderman Chamberlain—whose "sagacious audacity" had been matter of comment—viz., "Looking back to the past, I find that if this matter had only been before the council on similar terms, and in the same shape, fifteen years ago, at this moment we should be saving £15,000 a year, to say the least. I see no reason for supposing that fifteen years hence we may not have to congratulate ourselves upon a like or even a greater saving." At the next meeting of the council, Alderman Chamberlain reported that the arrangement had been made, and added—"Reviewing the whole matter once more, I consider that without these speculative items the corporation may rely upon making £15,000 to £20,000 the first year, and in a few years they must of necessity make something like £25,000 per annum." They had removed from the consumer, since they took possession of the works, £30,000 in the reduction of price, £10,000 in illuminating power; they had paid over 7d. in the pound to the borough improvement rate—equal to one-fourth of that rate; they had carried to the sinking-fund £3832; there was £4000 in respect of Fazeley Street; and they had placed to their credit the amount of £24,388 for the reserve-fund. The consumer had received £40,000, and the ratepayer had been relieved, or would be relieved, to the extent of £62,220.

Alderman MANTON, in seconding the motion, said he hoped Mr. Marris would state to the council what additional storeage was contemplated.

Mr. BEARD said it was impossible fully to criticize figures which were only just laid before the council; but there were many items in the balance-sheet to which he should have been pleased to refer, if he had had the opportunity of examining them. Having addressed the council many times during the past year on this question, he feared an impression had been made that he had been personally opposed to the committee, and that he had been doing everything he possibly could to annoy them. He could assure every member of the council that that had been the last of his thoughts. He had always proceeded upon the presumption that national, municipal, and local councils had established a custom that honesty of purpose was the first law to be recognized, and that questions of a personal character were never dreamt of. He could only say that the thanks of the council were due to the committee for the amount of work they had undertaken, and which they had so well performed; but while agreeing upon that, he differed with them upon details. Mr. Marris had endeavoured to show that the Gas Committee had made £34,000 profit during the year. What he asked was, what proportion of that profit was due to the actual savings effected by the corporation management, and what amount of it was due to the lesser amount of interest which the corporation would have to pay for the acquiring of those works? Having ascertained those two things, he said that that, and that alone, was the amount the corporation were entitled to transfer to the benefit of the ratepayers. He granted that there was no condition in the Act of Parliament providing that that only should be considered, but they had the promise of members of the council that that should be the condition upon which the profits would be considered, and he had before him the speech of Mr. Chamberlain in the town-hall on April 13, 1874, in confirmation of his (Mr. Beard's) contention. Mr. Chamberlain said:

> In the first place, let me assure you that those gentlemen are wrong who have written letters to the papers and assumed that this amount of profit will only be obtained at the expense of the gas consumers—(A Voice: Will you guarantee that?) Yes, I will; most certainly I will. To make a profit in such a way as that would be a mere juggle, merely paltering with the ratepayers. It would be merely taking out of one pocket and putting into another—a proceeding with which I should be thoroughly ashamed to be connected. I give you my word that the whole of this calculation is based upon the assumption that we shall continue to charge precisely the same rates for the gas as the companies would have charged if they had gone on as separate undertakings.

He asked, had the corporation done that? He was bound to say that there was no evidence to prove that it was so. The corporation said to him as a consumer, and to every consumer in Birmingham, that the whole of the profit made by their transactions they appropriated for the benefit of the rates, and that was where he and they were at issue. The consumer had a right to be considered, and as he was the party who found the money, he ought to be considered upon the question. Nothing had been adduced to show that the £30,000 had been made without prejudicing the position of the consumer, to the difference between the actual saving effected and the amount which had been transferred. He unhesitatingly said that day that the illuminating power of the gas, although very much better than it had been for a long time, was not so good as the companies gave before negotiations were opened up for the purchase, and he could prove it by undisputable evidence. In considering the interests of the gas consumers, he was considering the goose that laid the golden eggs. In supplying gas to the manufactories and workshops at as low a price as they could, they would be assisting the industry of the town.

Alderman AVERY, having expressed his satisfaction at the way in which Mr. Marris had laid the affairs of the Gas Committee before the council, said it was also very gratifying to find that there was a surplus on the gas undertaking of £34,000. Mr. Beard joined issue upon that, and endeavoured to show that that profit was not earned out of economies and results of corporation management, not out of anything which had taken place, but at the expense of the gas consumers. If they followed that argument to its logical conclusion, it necessitated that the gas consumers and the ratepayers were different and distinct persons, or else that there was no profit at all. He was quite willing to discuss that point, but he should be quite comfortable with the material guarantee of £30,000 in their pocket. That profit was to a very large extent the legitimate result of the consolidation of services, and other matters in the corporation management of the concern. At the same time it must not be forgotten that there had been a substantial reduction in price.

Alderman COLLINS remarked that, although Mr. Beard might regard himself as the representative of the gas consumers, other members of the council felt that they represented the ratepayers, and they were determined to do for them the best they could. As to the gas consumers being the golden goose, and the people who brought grist to the mill, he should like the council to imagine for a moment that some grave accident took place to their works, that they blew up, or something of that sort, and were of no use whatever, what would the golden goose do then? It would be the ratepayers and not the consumers who would have to pay the piper. The consumers bore no part of any loss, but were simply customers of the concern. He wished to move an amendment to the resolution before the council, though not a hostile one. He was aware that it was an unusual course to adopt, but the circumstances were unusual, and, in his opinion, would fully justify it. His amendment was—"That the report of the Gas Committee be approved, and that, considering the manner in which the business of gas supply has been acquired and conducted, whereby in less than two years afterwards £60,000 has been obtained for the work of the borough and the benefit of the inhabitants, whilst at the same time the price of gas has been reduced, and its quality improved, the council hereby record their thanks to the chairman and members of the Gas Committee for the eminent services which they have rendered to the town." He thought such a resolution would give in a complete form the best answer to one or two gentlemen, inside and outside the council, who challenged the policy which the council had pursued in respect of the gas. It should be borne in mind that the gas was not like the water, in which profit was obtained in the increased health and comfort of the people; but unless it bore a profit which would aid the rates, it was no use to the corporation at all. Referring to Mr. Beard's letter to the newspapers, he had never seen a more selfish policy advocated in any document he ever read. If such a policy were adopted by the council he should be ashamed of that body. The work of Alderman Chamberlain in promoting the acquisition of the gas undertaking challenged the admiration of all of them, and even though it had been less successful than was expected, he believed the council would still have regarded Alderman Chamberlain's efforts as a noble work. There were some people outside the council who were continually trying to pick holes in the work, and who betrayed a mean and selfish jealousy, which he was sure would never enter into that assembly; but he was glad the great body of the people of Birmingham recognized that and other great works which the council had done.

Mr. MATHEWS seconded the amendment.

After some remarks by Mr. BAKER, Alderman BRINSLEY, and others,

Mr. MARRIS briefly replied, and in answer to Alderman Manton he stated that, at the time of the transfer, the Staffordshire Company had nearly completed the erection of a large holder, capable of containing 2 million feet of gas. That had been completed, and was now in use. A similar holder was in course of erection, and a third was contracted for. The committee hoped this would be sufficient for some time to come. With regard to Alderman Brinsley's question as to the present prices of gas and coal, as compared with 1874, he pointed out that the corporation were obtaining a less price for coke than was obtained then, and wages had considerably risen. The only thing the committee had really had in their favour during the past year was the low price of iron. In reply to Mr. Beard, he pointed out that the consumers were in as good a position as they could possibly have anticipated had the old companies continued, and they had no right to expect more than that.

The amendment was then put and carried.

HONLEY GAS COMPANY, LIMITED.—At the annual meeting of shareholders, on the 19th inst., a dividend at the rate of 10 per cent. was declared, and the price of gas was reduced from 6s. 3d. to 6s.

APPROPRIATION OF GAS PROFITS AT BIRMINGHAM.

[From the *Birmingham Daily Gazette*.]

The figures we have quoted show at a glance where the money goes which should be employed for increasing the reserve-fund, if not for other purposes directly connected with the gas supply. Of the net profit in the year, of £34,000 and odd, the borough treasurer takes £30,000 for purposes other than those connected with the gas department. In fact, that department is a milch cow to the Town Council, and it is questionable if it is not over-milked to a dangerous extent. This, indeed, was the question which chiefly occupied the time and attention of the council when the gas report was under discussion. Mr. Beard set forth, certain views on the point which were not favoured by the council as a body, but which are, nevertheless, in perfect harmony with all recognized financial rules and economic principles. He contended that there ought to be no such mixing up of accounts as that which at present prevails by favour of the council. Repeating the arguments which he recently advanced in a letter printed in these pages, he urged that it is manifestly unjust for the gas consumers, who are less than half the entire number of ratepayers, to pay general rates twice over—once directly, and once through the profits which they contribute to the gas accounts. A more satisfactory, regular, and equitable way would be to treat the gas as it is proposed to deal with the water—viz., to give every encouragement to householders to consume gas, charging to all classes rates from year to year sufficient only to pay working establishment expenses, interest on capital, and to set aside yearly a sum to be agreed upon to redeem the debt created for the purchase, so as to reduce the price to all consumers to the lowest minimum consistent with proper maintenance of the service. There is really no gainsaying those arguments, and it is surprising that their absolute soundness does not commend them to the approval of the many men of business who form a majority of the Town Council. The gas monopoly which the council claims and enforces should be kept free from the sin of the most objectionable monopolies of former times—excessive profits. The consumers should in justice get the benefit of any surplus profits that are made on the sale of gas, always allowing an ample margin for contingencies; and it is a most vicious financial policy to tax such consumers in order to raise money for general rating purposes. It is unjust to the gas consumers, who are thus made to contribute twice to the rates; it is demoralising to the Town Council, which imposes such a duplicate tax on a special class of its subjects; and it is misleading to the ratepayers at large, who are thus deceived as to the real cost of government. Moreover, there is one class of consumers which has a special right to object to this system of indirect taxation. We refer to those gas consumers who reside beyond the limits of the borough. Whatever may be said in defence of the principle of charging unnecessary high gas rates to residents in the borough—as that they derive some benefit from the profits extracted from them, by other rates not being so high as they otherwise would be—it is obvious that no such defence can be made to the complaints of the outside consumers that they are made to pay Birmingham borough rates through the gas account.

Neither to the borough nor the extra-borough consumers is it any fair answer to say that the price charged for the gas, notwithstanding the excess of profit made, is reasonable and well below the maximum. When a governing body takes into its hands the supply of such essentials to health, comfort, and general well-being as gas, water, and the like, it should not do so for the purpose of securing large gains to be devoted to other purposes, in the manner of an ordinary trading company. The great object and intention of the Legislature in vesting corporations with the power of becoming owners and manufacturers in certain generally required commodities was to secure their cheap, regular, and abundant supply, as essential to the interests of the people at large. It was not contemplated to make that supply a source of profit to be applied to general local purposes. It was designed beyond question to leave the expenditure for such purposes to be met in the ordinary way by the levying of direct rates, and to cheapen the cost and encourage the consumption of such things as gas and water by giving the consumers the full benefit of any profits made by their sale. It is true that the Birmingham Corporation Act, 1875, has a safety-valve clause allowing any stray surplus profits, after the formation of a large reserve-fund and the payment of all direct and incidental expenses, to be absorbed in the borough rates; but this, in the intention of the Legislature, is obviously far removed from any idea that a system should be instituted of making regular excess profits, at the cost of the gas consumers, to be applied to other purposes. Look at the matter as we may, it is evident from every point of view that such a system is economically wrong, grossly unfair to one section of the ratepayers and misleading for the other, and altogether condemnable.

No doubt the town is to be congratulated on the great success of the gas venture, but the twice-taxed consumers will not be favourably impressed with the policy of wringing large surplus profits from them in order that the other ratepayers should benefit thereby.

Wednesbury Water Supply.—At the meeting of the Wednesbury Local Board on the 19th inst.—Mr. Williams in the chair—the Clerk reported that, having considered the various Acts of Parliament of the South Staffordshire Water-Works Company, he was of opinion that the laying down of the new mains along the Walsall Road was in excess of the powers of the company. The company's officials maintained, however—erroneously, as he thought—that the mains were for distributive purposes, and were therefore warranted by the General Water-Works Clauses Act. Mr. Blackmore considered that, even if there were some little irregularity, it would be impolitic on the part of the board to interfere, seeing that the works were for the benefit of the town. Several members urged that the works were not for the benefit of Wednesbury, but for the purpose of ensuing a regular and better supply at Dudley and other places, where the authorities had been engaged in litigation with the company. The Chairman said the pipes the company were laying down were for the benefit of Wednesbury as well as Dudley, seeing that when the works were completed the latter town would be supplied through an independent pipe; and he did not know that the board would be wise in placing obstacles in the way of the company, which for years had been the greatest philanthropist and the best friend Wednesbury had ever had. Before the formation of the company the inhabitants of the town got their supplies of water from foul wells, from the canal, and even from the forges, but the supply which the company had afforded had contributed more than anything else to the preservation of that clean bill of health which Wednesbury presented, as compared with other places; and what was more, the company for many years afforded that supply without a dividend, and then for some years more with only a very small dividend. He was, therefore, disposed to give the company the benefit of any doubt there might be in the matter of their having exceeded their powers; but at the same time he thought the permission of the board for the breaking up of the roads should have been asked, and that the company should be required to do the work as speedily as possible, and to put the roads into complete repair afterwards. A general conversation followed, and eventually the clerk was instructed to write to the company to the effect suggested by the chairman.

LIVERPOOL UNITED GASLIGHT COMPANY.

The Half-Yearly General Meeting of Shareholders was held on Tuesday, the 20th inst.—Mr. J. A. Tinne in the chair.

The Secretary (Mr. Garnett) read the directors' report, which was as follows:—

The directors having caused to be prepared and submitted to them an estimate of the profits of the company for the half year ending the 31st of December last, in accordance with the company's Acts of Parliament, and having duly considered the same, recommend the proprietors to declare a dividend for the half year ending as above stated of £5 on every £100 of the ordinary consolidated stock, and at the rate of £3 10s. for every £100 on the consolidated B (7 per cent.) stock, and on the capital paid up in respect of the new £7 10s. shares.

The directors have to deplore the loss which the company have sustained by the recent death of Sir Hardman Earle, Bart., who had been a member of the board ever since the amalgamation of the two companies in 1848, and previously for about 14 years a director of the original Liverpool Gaslight Company, making together a period of above 42 years, during which time his services were always most valuable to the companies.

The question of allowing interest on deposits made as security for payment of gas supplied has engaged the attention of the board, and arrangements have been determined on for making such an allowance in future. This concession will, it is hoped, remove all objection to the system, the maintenance of which is essential for the protection of the interests as well of the general body of gas consumers as of the shareholders of this company.

The Chairman, in moving the adoption of the report, said this was not the meeting at which the directors published any accounts. He had much satisfaction in saying that, although the accounts were not presented, the affairs of the company were in a very satisfactory state, and they had the pleasure of declaring about the usual dividend, which had been fairly earned.

Mr. D. O. Bateson seconded the resolution, which was passed.

On the motion of the Chairman, dividends in accordance with the recommendation were formally declared.

Mr. Harmood Banner moved a vote of thanks to the chairman and the directors for the very satisfactory manner in which they had conducted the affairs of the company.

The motion was put and carried unanimously, and the proceedings terminated.

Leominster Gas and Coke Company, Limited.—The twenty-seventh half-yearly general meeting of shareholders was held on Thursday, Feb. 15, when the following report was submitted:—"The accounts of the company for the year 1876 show a continued increase in the consumption of gas, amounting to 535,400 cubic feet, or about 8 per cent. on that of the previous year. On the 1st of July last a reduction in the price of gas, from 5s. to 4s. 7d. per 1000 cubic feet, was made. The net profit of the year has been £684 2s. 3d., out of which the interest on loans has to be deducted. The directors recommend the payment of the usual maximum dividends, viz., at the rate of 10 per cent. per annum on the original shares, and 7 per cent. per annum on the "B" shares, for the half year ending Dec. 31, 1876, a dividend of the same amount having been paid for the half year ending June 30. The balance to be carried forward will be £29 7s. 2d. The suspense account which arose out of the large amount expended on renewals in 1875, and which stood last year at £300, has been reduced to £150, the balance having been charged in the revenue account to repairs and maintenance of works. The directors believe that this item will have disappeared altogether in the next published statement. In addition to this charge, 13 new retorts have been provided and are now on the ground, and considerable repairs have been done to the station-meter. The cost of these has been wholly charged to revenue. During the present year it will be necessary to provide 10 more retorts, and to reset the whole 23. With this exception, no material outlay for renewals is likely to be required. Out of the charge to capital, about £230 is due to the erection of the new pair of purifiers. Since these were brought into operation the cost of purifying material has been largely reduced. It has now become a subject for consideration whether, having in view the continued increase in the production of gas, it may not be desirable to erect an exhauster and scrubber during the present year."

Sewer Gases.—At the last meeting of the Royal Society, Professor E. Frankland communicated a paper "On the Transport of Solid and Liquid Particles in Sewer Gases." He first referred to the large amount of suspended matter in the air, which consists of aqueous and other volatile particles that disappear by a gentle heat. There are other particles that consist partly of organic and partly of mineral matters, and the processes of fermentation, putrefaction, and decay afford abundant evidence that zymotic and other living germs are present among the organic portion. Of the zymotic matters, those which produce disease in man are obviously of the greatest importance, for there are well authenticated cases on record that disease has been communicated by the germs being in suspension in air that has escaped from sewers. Professor Frankland has considered it important to investigate the conditions under which the germs pass from sewage into the air. Does the flow of sewage in a properly constructed sewer produce sufficient agitation to disperse liquid particles through the air space of the sewer? In this and in the other experiments mentioned below a solution of lithic chloride was used, Professor Frankland having previously ascertained by three separate tests that no lithic chloride is carried off at ordinary temperatures by aqueous vapour from a saturated solution of it. Some of the solution being placed in a glass jar, it was agitated, and though this was done with greater violence than would ever happen to fluid in a sewer, it was proved that none of the lithic chloride was disengaged. It is, therefore, extremely improbable that the mere flow of foul liquid through sewers can impregnate the circumambient air with suspended particles. There is, however, another kind of agitation to which sewage is subject that may produce a very different result—viz., the development of gases during the processes of fermentation and putrefaction. When minute bubbles burst at the surface of an effervescing liquid, little particles of it can be seen projected into the air some inches, and then falling again. Professor Frankland experimented to test whether particles too small to be seen might not be also projected, and in consequence of the smallness of their masses in relation to their sectional areas, might continue suspended in the air for a long time. A strong solution of lithic chloride was acidulated by the addition of hydrochloric acid, some fragments of white marble were added, and this produced an effervescing liquid. A tube 3 inches in diameter and 5 feet long, was held over it, and there were distinct traces of lithium found during effervescence at the upper end. A second tube 3 inches in diameter and 12 feet long was then held nearly at right angles at the top of the first, a slight draught through it being caused by external heating. At the further end of this tube, too, lithium was distinctly traced. The particles were also found to pass readily through two inches of charcoal, and they passed even a layer five inches thick, though in greatly diminished numbers. Here, then, in the breaking up of minute gas bubbles, is a cause of the suspension of particles in the air. If, therefore, through the stagnation of sewage or constructive defects which allow of the retention of excrementitious matters for several days in a sewer, putrefaction sets in, then gases are generated, and the dispersion into the air of zymotic matters is very probable. It is of the greatest importance that foul liquids should pass rapidly and freely through drain-pipes and sewers, so as to secure their discharge from the system before putrefaction sets in.

IPSWICH GASLIGHT COMPANY.

The Annual Meeting of Shareholders was held on Monday, the 19th inst.—Mr. W. Bunn, Chairman of the Board of Directors, presiding.

The Secretary (Mr. E. Goddard) read the notice convening the meeting, and the minutes of the last general meeting.

The following report and statements of account were submitted:—

The directors have pleasure in presenting to the shareholders a statement of the accounts for the year ending Dec. 31, 1876.

The profit and loss account shows a balance available for the payment of dividend amounting to £6511 16s. The directors, therefore, recommend that a dividend of 10 per cent. per annum be paid upon the original shares, and 7½ per cent. upon the new shares, and that the balance be carried forward to the next account.

The directors report that the extensions to the working plant referred to in their last report are, to a large extent, completed. The new retort-house has been fitted up with two stacks of retorts, each stack containing 35 retorts 20 feet long, being equal to 140 retorts of the ordinary size. One-half of these have been in full operation during the present season; also the new condensing apparatus, Mann and Walker's patent scrubber, and one of Körting Brothers patent steam-jet exhausters.

The works now in progress are two additional purifiers, 20 feet square, with machinery for hoisting the purifying material, by which a considerable saving in manual labour will be effected, and also two of West's patent mechanical stokers, for drawing and charging retorts. The directors purpose laying down a siding from the tramway on the quay to the company's premises, for giving increased facility for the despatch of coke by rail.

A larger main has been substituted for the main from the Crown Corner, St. Peter's, to the Wherstead Road, with the view of improving the supply of gas to the manufactories on the Stoke side of the town. Extensions and enlargements of mains have been carried out in other districts of the borough.

In consequence of these extensions it will be necessary to raise additional capital. The directors recommend that the sum of £3000 be raised by the creation of 300 new shares of £10 each, and also to raise as much by loan on mortgage as the Act of Parliament will sanction, which will not exceed the sum of £1600.

During the past year communications have been received from the corporation in reference to the sale of the company's works, plant, &c., to the sanitary authority of the borough. The terms proposed by the corporation were to pay perpetual annuities equal to 10 per cent. on the original shares and 7½ per cent. upon the new shares, or for annuities of like amount to be redeemed by the corporation at the expiration of 20 years, at 20 years purchase.

The directors, having regard to the interests of the shareholders, made inquiry as to what was the practice in cases where gas-works had been taken over by local authorities, and sanctioned by the Legislature; and finding the terms offered by the corporation to be much below the price given in other towns, respectfully declined the offer.

The directors hoped to have been able to announce at this meeting a further reduction in the price of gas to private consumers; but the very large depreciation in the value of coke renders it impracticable at present to do so.

The following directors go out of office by rotation, but are eligible for re-election—viz., William Alexander, Esq., W. B. Jackaman, Esq., and William Turner, Esq.

Mr. William Bantoft, one of the auditors of the company, retires by rotation, and is eligible for re-election.

Dr. CAPITAL ACCOUNT, *for the Year ended Dec.* 31, 1876. *Cr.*

—	Expenditure to Dec. 31, 1875.	Expended this Year.	Total to Dec. 31, 1876.	—	Certified Receipts to Dec. 31, 1875.	Received during Year.	Total Receipts to Dec. 31, 1876.
To Expenditure to Dec. 31, 1875. . . .	£62,074 2 3	..	£62,074 2 3	By Ordinary shares of £10 each	£28,000 0 0	..	£28,000 0 0
Since that date—				Ditto Ditto	24,925 0 0	1,075 0 0	26,000 0 0
New buildings, manufacturing plant, machines, storeage works, and other structures connected with manufacture	..	£7,805 12 11	..	Mortgages and bonds	15,400 0 0	2,000 0 0	17,400 0 0
New mains and service-pipes (not being in place of old ones), including laying same, paving, and other works connected with distribution.	..	117 12 0	..	Premium-fund account	4,571 19 3	..	4,571 19 3
New meters (not in place of old ones), including fixing	..	221 2 9	8,144 7 8				
Total expenditure . . .	..	..	£70,218 9 11				
Balance of capital account	..	..	5,753 9 4				
			£75,971 19 3				£75,971 19 3

REVENUE ACCOUNT.

To Manufacture of gas—				By Sale of gas—		
Coals, including dues, carriage, unloading, and all expenses of depositing same on works . . .	£10,158 11 3½			Private light rental	£15,830 17 8	
Purifying materials, oil, water, and sundries at works	382 15 10			Public lighting and under contracts	1,801 17 3	
Salaries of engineers, including chief engineer, superintendents, and officers at works . . .	826 17 7					£17,632 14 11
Wages and gratuities at works.	1,677 15 10			Rental of meters	..	500 9 7
Repairs and maintenance of works and plant (including renewal of retorts), machines, apparatus, tools, materials, and labour	896 5 8			Residual products—		
		£13,942 6 2½		Coke, less labour and cartage	£4,255 11 2	
Distribution of gas—				Breeze ,, ,, ...	174 2 8	
Salaries of surveyor, chief inspector, inspectors, assistant inspectors, and clerks in light office .	135 6 8			Tar ,, ,, ...	927 9 3	
Repair, maintenance, and renewal of mains, and of service-pipes, including materials, laying and paving, and labour.	295 8 8			Ammoniacal sulphate, ditto	530 12 10	
Repairing, renewing, and refixing meters . . .	438 5 7					5,887 15 11
		869 0 11		Rents.	..	108 0 0
Public lamps—				Fittings	..	146 9 9
Lighting and repairing	..	497 14 8				
Rents, rates, and taxes—						
Rates and taxes	..	591 11 5½				
Management—						
Directors allowances	200 0 0					
Salaries of secretary, accountant, and clerks, office keepers and messengers	266 13 4					
Collectors commission or salaries	150 0 0					
Stationery and printing	53 19 0					
General establishment charges and incidentals .	88 1 8					
Auditors	21 0 0					
		779 14 0				
Law and parliamentary charges—						
Law	..	14 19 1				
Bad debts	..	298 1 9				
Suspense account	..	442 13 4				
Total expenditure	..	£17,436 1 5				
Balance carried to profit and loss account	..	6,839 8 9				
		£24,275 10 2				£24,275 10 2

The profit and loss (net revenue) account which was appended showed a balance at credit thereof of £6511 16s., subject to payment of the dividends to the 31st of December last; the reserve-fund showed a balance to credit thereof of £2747 4s. 8d., and the capital account a balance to credit of £5753 9s. 4d.

The Chairman, in moving the adoption of the report, said it fully set out the progress of the concern during the past year, and he did not know that there was anything which required comment from him.

Mr. Huish seconded the motion.

Mr. W. B. Jeffries said the thanks of the shareholders were due to the board for the manner in which they had managed the affairs of the company; but he thought they had somewhat overstepped their duties when they decided that the shareholders should not sell the gas-works to the corporation. They had an offer from the corporation to take over the concern, and to pay in perpetuity to the shareholders the utmost the law would allow in the way of dividends; and, therefore, it seemed somewhat out of order for the directors to say, "No, you shall not accept that offer, but you shall take what dividends we choose to give you for the present, and run the risk of gas being superseded, and a less dividend being earned in future years." The proper course would have been for the shareholders to be called together and their opinion taken as to the offer. There was 10 per cent. on the old and 7½ per cent. on the new shares offered in perpetuity, and it was perfectly impossible for the shareholders ever to be in a better position than they would be if they had accepted the offer. He had been averse to corporate bodies managing commercial affairs, but if the corporation were in a position to say that they could produce better gas at a cheaper rate than was now charged, and offered the shareholders the maximum dividends, he felt strongly that the shareholders ought to have had a voice in the matter before the offer was refused.

The Chairman said the directors did not come to this resolution hastily. They made inquiries from other places where similar propositions had been made. It was true the corporation offered annuities equal to the maximum dividends, but still the offer was saddled with a twenty years purchase clause, and they found in other places that that was not acceded to, but much larger amounts were given.

The Secretary: Twenty-five years purchase.

The Chairman said twenty-five years was the lowest it was proposed to offer in other places. Therefore, the directors came to the conclusion that they would not be right in acceding to such a proposition, and respectfully declined it. He believed where compulsory powers to purchase were taken, a much larger price was given.

The Secretary: No, twenty-five years. There is now a Bill in Parliament to enable the Warrington Corporation to acquire the gas-works, and in that Bill twenty-five years purchase of the annuities is proposed.

Mr. W. J. Andrews said a great many shareholders would have been much dissatisfied if the directors had accepted the offer. They entrusted the directors at the last meeting to do the best they could for them, so that it was not necessary to call a meeting of shareholders.

Mr. W. Alexander said the board regarded the offer of the corporation as so far below what could be accepted, that they did not think it worth while to submit it to the shareholders.

Mr. S. A. Maw said at the time the offer of the corporation was made, it was, no doubt, to some extent, a good offer, but it was only a partial one. The corporation proposed to take everything the company possessed, with the exception of a small amount of £1600, which they offered to leave in their hands, basing their estimate of the value upon the income to which the company were limited by Act of Parliament. No doubt the dividends were so limited, but to some of them it appeared that in estimating the value of the undertaking it would be right to take its commercial value into consideration, as well as its present limited income. There was one phase of the matter which

he believed struck him more strongly than it did many, and it was that no allusion whatever was made to a large amount of capital used in the concern on which no interest was paid, or, if interest was paid on it, it was by a reduction of the interest on other capital. This capital the corporation proposed to take without giving any compensation whatever. He was speaking of the premiums, amounting to £4571, which the company had received by the sale by public auction of the new shares which had recently been created. This large amount of capital had been furnished on which no interest was paid, and the corporation seemed inclined to think that they had a right to take it without paying any interest on it in future. He did not regard it in that way. Perhaps it might be that the company had no claim for a higher price in consequence of compulsory sale, or in acknowledgment of this large sum, which the corporation seemed to regard as though it belonged to the town. No doubt there was a difference of opinion as to how far this sum which they had received, and had used for the benefit of the town, did really belong to the town or to the gas company, for it seemed to be thought by some that these premiums beyond the nominal value of the shares belonged to the town, and that the shareholders had no interest in them. When he looked back several years to the origin of the fund, he found there had, for some years, been criticisms as to the gas company and its management; it had been said that the company had a nice comfortable business, and obtained a good rate of interest, and that it was a close corporation. The directors and shareholders, however, did not wish to make the company exclusive, and offered the new shares then created to the public in order that those gentlemen—whether they had a little jealousy about the company, or whether they thought they could manage it better than it had been managed—might have an opportunity of joining the company. This plan had answered the purpose, in so far as it had furnished them with a large amount of capital on which no interest was paid, and in that way had, no doubt, added to the value of the shares in general, by ensuring to a considerable extent the maximum dividend; but, he must say, he had felt surprised that those gentlemen, who seemed to think the directors were managing the concern too exclusively, had not taken advantage of the opportunity to come among them and see whether they could not manage it better. Those who criticized had not taken advantage of the opportunity, but capitalists who wished to ensure a good 5 per cent. had. The plan of offering new shares for sale by auction had, therefore, failed in its object. Gas consumers had been publicly told that the company were issuing shares on which 7½ per cent. interest was paid, when the money could be borrowed at a much lower rate, and gas made very much cheaper; but, as a matter of fact, the new shares were not receiving 7½ per cent., but a very little over 5 per cent., on account of the existence of the premium capital. He did not wish to be in antagonism to his brother directors, but he confessed that he looked upon the mode of issuing shares, by selling them by auction, as to some extent a failure, for the reasons he had stated, and now the directors proposed to pursue the same plan again by the proposal of issuing 300 new shares. He had had the opportunity of expressing his opinion on the subject to his brother directors, but he was in a minority at the board. He regretted that it was so, for he thought it a question that it became them seriously to consider, whether they should continue this mode of disposing of the shares, or whether they should not revert to that which was formerly the practice in this company, and was the practice in some companies still—allotting the new shares among the present shareholders. At the directors meeting he proposed that a larger number of shares should be issued, not fully called up, but only such a proportion as would provide the capital absolutely wanted. This was a concern which was largely increasing, and, though during the past year things had been dull, the large agricultural implement manufactories and iron-works not having consumed anything like the amount of gas they did in former years, yet when a brighter period came, and the former activity at these works returned, a further outlay of capital would be necessary for a new gasholder. The probability was that next year or the year after the company would have to issue another 300 shares, and his proposition at the board was that a larger number of shares should be issued on which only so much capital as was required should be called up. There were now 5400 shares, and if 540 more had been issued there would have been one new share for every 10 existing shares, and by proceeding in that way the present shareholders would have had the opportunity of receiving the full benefit of 7½ per cent., if the company earned it. If these 300 shares were sold by auction, probably £4000, at least, would be received for them, whereas if issued among the shareholders at par, £3000 only would be received, and, therefore, the town would have the benefit; and it should be borne in mind that there were those who looked upon the company, not as carrying on a business for themselves, but as if they were, after all, only town servants out of livery. They did not furnish even the directors with a cocked-hat, and were yet inclined to treat them as only town servants. It was rather humiliating to find, after having carried on for half a century a good beneficial business, they were regarded as in this subsidiary position. He knew to a considerable extent they were servants of the public, and that they had not an Act of Parliament merely to give them a good income on their shares, but to confer a benefit on the town. He admitted that it was so to a large extent, but thought the thing had been carried a little too far.

The CHAIRMAN was sorry the directors were not exactly unanimous on the point, but it would be remembered that when the company got their new Act some years ago they first adopted the system of offering the new shares to the public. The directors desired to show that the company were not a close body, and the shareholders cordially sanctioned the view they took. This was an age of progress, and he should not like to go back to the old system again, and he hoped the meeting would take that view of it.

Mr. MAW admitted that he was in a minority at the board. He was somewhat—he would not say annoyed, but he would say he thought the company had not been treated in quite the respectful way in which a body of gentlemen who for years had succeeded in doing a great deal for the benefit of the town, as well as for the benefit of their shareholders, might have been treated. It had been put before the ratepayers that they were charging a higher price than they need, when really the price was as low as, or lower than, almost any gas company in the neighbouring towns.

The CHAIRMAN, in answer to an inquiry, said he had not heard of one of the complaining parties buying shares at the last sale. They were purchased chiefly by outsiders.

After some further conversation, the motion for the adoption of the report was put and carried. The retiring directors and auditor were re-elected, and the remuneration of the directors was increased from £200 to £300 per annum.

The meeting was then made special, to consider the question of raising new capital.

The CHAIRMAN moved that the capital of the company be increased from £54,000 to £57,000, by the creation and issue of 300 shares of the nominal value of £10 each.

Mr. J. C. COBBOLD seconded the motion, which was put and carried.

The CHAIRMAN next moved—"That the said 300 new shares shall be offered to the public by auction, at such times, in such numbers, and on such terms and conditions as the directors may deem expedient."

Mr. COBBOLD seconded the motion. As a shareholder, he said he should quite agree that the principle of allotting new shares among existing shareholders was one that would recommend itself to him, but they had deliberately adopted a different principle on a former occasion, and one which had been acted upon by many public companies, and confirmed by several Acts of Parliament of joint-stock companies, and on that ground he concurred with the majority of his brother directors.

The SECRETARY thought a little explanation might be desirable from him. When the Ipswich Gas Company adopted the plan of offering the shares of new capital, to the public, it was with the view of removing the impression that the company was a monopoly, as every one then had an opportunity of becoming a shareholder. At that time the plan of offering new shares by auction was adopted by but very few companies in the country, but since then the clause for the sale by auction of new shares had been adopted in almost all the Gas Acts that had been through Parliament, and it was now one of the standard clauses in all new Bills that came before the Legislature.

Mr. JEFFRIES moved, as an amendment, that the new shares should be offered to the present shareholders. He was always ready and willing to do everything he could for the good of his fellow-creatures and neighbours. This company had done pretty well in the past, but if any failure took place in the future the shareholders would have to suffer. Gas consumers, if they did not have a supply, would not have to pay for it, and if the undertaking was now a success the shareholders had had to run the risk of its not being so. Those who in the past had stood to lose their capital should be those to reap the profit in these times of success. After what had been done they could not be said to be a close corporation, and, though he did not like to take a job out of the hands of their friend, Mr. William Turner, he must propose the amendment.

Mr. G. S. CLARKE seconded the amendment.

Mr. COBBOLD said the difficulty which would attend the distribution of so small a proportion of shares would be great.

Mr. JEFFRIES said the mode of distribution could be left to the directors.

Mr. W. ALEXANDER said he was one of the minority of the directors on this question, but he admitted the difficulty arising from the small number of shares to be allotted compared with the total number of existing shares. He suggested that it might be understood that in future the shares should be allotted among existing shareholders.

Mr. G. S. CLARKE observed that the difficulty had been got over in former issues of new shares.

The SECRETARY said the capital originally raised was £14,000, and when it was increased to £28,000, one new share was allotted for each old one. When by the second Act £14,000 more was raised, one new share was allotted for each two old shares. Since that time the whole of the new shares had been sold by auction.

The SECRETARY stated, in answer to Mr. JEFFRIES, that there were about 300 shareholders.

Mr. JEFFRIES suggested that one new share should be offered to each proprietor, but it was argued that this would be unfair, and that the allotment should be *pro ratâ*.

The amendment was carried by 18 to 7.

The CHAIRMAN said he should be glad of the instructions of the meeting how the shares were to be allotted. There were 278 shareholders.

Mr. ANDREWS moved that the new shares should be distributed *pro ratâ* by the directors among the existing shareholders.

Mr. HUISH seconded the motion, which was carried.

On the motion of the CHAIRMAN, it was resolved to raise £16,000 on mortgage, the chairman explaining that this was the limit they had power to borrow.

On the motion of Mr. JEFFRIES, a vote of thanks was passed to the chairman; and on the motion of Mr. ACFIELD the thanks of the shareholders were conveyed to the secretary for the able manner in which he has conducted the business of the company for so many years.

CORK GAS CONSUMERS COMPANY.

The Ordinary General Meeting of Shareholders was held on Tuesday, the 20th inst.—Mr. T. MAHONEY in the chair.

The SECRETARY (Mr. Denny Lane) read the report of the directors and statements of account as follows:—

Annexed hereto you will find the accounts of the company for the half year ending Dec. 31, 1876. The gas-rental is about £1000 less than in the corresponding period of 1875, but this is accounted for by the reduction made on the 1st of January last year of 6d. per 1000 cubic feet in the price.

We have just arranged with the corporation for a renewed contract for the public lamps, for a term of three years.

The reconstruction of the first retort-benches, erected by you in 1857, will be immediately proceeded with. This will involve a large outlay, but when the work is completed we trust that our wear and tear account will be considerably reduced.

We have written off £500 for depreciation in moveable stock, and added £150 to depreciation-fund; also £200 to insurance-fund. After these deductions the balance of the profit and loss account is £6275 12s. 3d., out of which we propose to pay a dividend at the rate of 8 per cent. per annum; this will amount to £5194, and leave £1081 to be added to reserve-fund, which will then stand at £6999 16s. 6d.

Resident Engineer's Report to the Directors.

Gentlemen,—In consequence of the good condition of your works, and the increased capacity of mains, I am glad to report that the supply of gas during the past winter has been abundant and satisfactory. On reference to your books, I think you will find that in no year since the establishment of the company have there been so few complaints of any deficiency, and that the few which were made arose altogether from purely local causes.

In the course of next month I will be prepared to commence the reconstruction of the first bench of retorts, erected by this company in 1857. When this work is completed all our settings will be in excellent condition, with the exception of some arches which have been working since 1860, and which will, probably within a year or two, require extensive repairs.—I remain, gentlemen, your obedient servant,

(Signed) THOMAS TRAVERS.

Capital Account, Dec. 31, 1876.

Dr.				*Cr.*		
Share capital of the company	£150,000	0	0	Amount paid on shares	£129,872	0	0
Debenture capital of the company	22,000	0	0	Ditto debentures	22,000	0	0
				Uncalled capital and shares not registered	19,698	0	0
				Due by shareholders on registered shares	430	0	0
	£172,000	0	0		£172,000	0	0

Revenue Account.

Coals	£9,406	15	7	Rental—			
Labour	2,728	8	8	September quarter	£4,650	0	6
Wear and tear	1,500	14	7	December ditto	11,838	11	4
Oxide of iron, lime, &c.	276	3	0	Public lighting—			
Water and gas at works	121	12	1	September quarter	770	18	6
Public lighting	287	6	10	December ditto	1,383	9	8
Salaries	847	10	0	Residuals	5,952	11	4
Rents	119	6	8	Transfer fees	5	13	0
Rates	783	13	2				
Advertising and stationery	79	2	8				
Office expenses	128	2	1				
House repairs	5	6	0				
Auditors	20	0	0				
Directors	175	0	0				
Profit and loss	8,072	2	4				
	£24,601	3	8		£24,601	3	8

Profit and Loss.

Thirty-seventh dividend	£5,193	0	10	Balance	£6,070	12 8
Reserve-fund	877	11	10	Revenue	8,072	2 4
Interest—Debentures	512	15	0			
,, Bank, &c.	43	12	4			
Charges	150	14	7			
Insurance	36	9	9			
Law expenses	2	18	5			
Depreciation of stk. materials	500	0	0			
Insurance-fund	200	0	0			
Depreciation-fund	150	0	0			
Bad debts and allowances	200	0	0			
Balance	6,275	12	3			
	£14,142	15	0		£14,142	15 0

Balance-Sheet.

Capital account—				Permanent investment to June 30, 1876	£144,099	17 8
Shares	£129,872	0	0	Extensions from above date to Dec. 31, 1876—viz.:		
Debentures	22,000	0	0	Works	£252 16 6	
Due to sundry persons	6,611	7	2	Mains	33 9 10	
Dividends unclaimed	265	7	7	Services	52 14 9	
Insurance-fund	1,293	10	2	Meters	324 11 2	
Reserve-fund £5,815 3 1				Ammonia	6 1 3	
Interest on above 103 5 7				Public lighting	6 7 9	
	5,918	8	8	Engineering	37 10 0	
Depreciation-fund	1,000	0	0		£713 11 3	
Bank current account	2,952	14	7	Less works—machinery returned to stck.	450 0 0	
Profit and loss	6,275	12	3	Accts., meters, and services	39 12 8	
					489 12 8	
					223	18 7
				Due by sundry persons	921	7 7
				Suspense account, *re* former accountant, to June 30, 1876 £1,533 13 8		
				Less dividend received from Court of Bankruptcy	19 4 7	
					£1,514 9 1	
				Viz.:		
				Joint National Agency bills on hand	245 0 0	
				Bowles Brs. bills	193 4 0	
				Balance	1,076 5 1	
					1,514	9 1
				Rental account	12,296	4 8
				Public lamps	2,348	6 6
				Stock, coals, meters, mains, oxide of iron, &c.	9,159	16 4
				Cork and Macroom Railway Company—invested in their debentures	1,825	0 0
				Cork, Blackrock, and Passage Railway Company for same	2,800	0 0
				Cork Harbour Commissioners for same	1,000	0 0
	£176,189	0	5		£176,189	0 5

The CHAIRMAN, in moving the adoption of the report and accounts, said: Gentlemen, I have very few observations to make to you. I have great pleasure in being able to bring before you so favourable a report of your affairs. Our reserve is now £7000. During last half year the increased consumption has only been to a very moderate extent. The quality of the gas has been remarkably good, and we never had so few complaints from our consumers. Mr. Anderson has been in the South of Europe for the whole of the winter and has only just returned. We have, therefore, no report from him, as he was not able to come over to inspect our works, being detained in London on parliamentary business. Although our meeting is held somewhat earlier than usual, we intend to send out our dividend this evening, so that you may have it to-morrow. I am sure you will have no objection to that.

Mr. M'OSTRICH seconded the motion, which was put and carried unanimously.

Mr. ALCOCK moved the declaration of a dividend at the rate of 8 per cent. per annum, free of income-tax. In doing so, he said there was a strong feeling outside that as, during the time the company were under the Board of Trade Provisional Order, the shareholders received only 5 per cent. for the capital they invested, and as they were now, comparatively speaking, sailing in smooth water, a contract having been made with the corporation, and no heavy works to undertake, and as they had a very large sum carried to the reserve-fund, the directors ought to consider the propriety of recouping the shareholders for the 5 per cent. which they got under the Board of Trade Order.

The CHAIRMAN: It was six we received previously.

Mr. ALCOCK said the directors had a precedent for pursuing such a course, because it had been done on a former occasion, and he thought those who had invested their money in the speculation were very well entitled to it. It would be desirable that the directors should consider the subject. It might be done in the shape of a bonus of 1 or 2 per cent. They were making no use of the reserve at present, and he threw this out as a suggestion to the board.

Mr. LAMERTE seconded the motion, and said that although in a great measure he was prepared to endorse what Mr. Alcock had stated, yet he thought that the directors could not now pay the shareholders the difference between the 8 per cent., and the 5 per cent. which they paid while under the Board of Trade Order. Previous to that time, however, there were one or two years when they paid a less dividend than 8 per cent.

The SECRETARY: One year.

Mr. LAMERTE said that, considering the large sum of money the board had as a reserve-fund, the shareholders, if the directors thought fit to give it, were entitled to a portion of the amount as a bonus, or in the shape of dividend.

The CHAIRMAN thought that some of the shareholders were under a misapprehension as to the arrears of dividend due to them. The directors dared not touch the reserve to recoup the shareholders for the decreased dividend paid while the company were under the Board of Trade. It was a matter they could not consider. They obtained permission from the Board of Trade to increase the price of gas beyond what they were authorized to charge by their parliamentary powers, but the Provisional Order enacted that during that time they should not divide more than 5 per cent. It was a very unjust arrangement, because it was not an arrangement applicable to the London companies, although they worked under the Board of Trade in the same way, and while they increased the price to the consumers they were allowed to divide 10 per cent. Unfortunately, this company could not go back on that now. But previous to that time they only received 6 per cent. for one year, and it had been a matter of anxious consideration to the directors whether they would at present make up any portion of that deficiency. They considered it more conducive to the interest of the shareholders to postpone such a course for the present. It would be a matter of greater interest to the directors themselves, for the board represented £30,000 of the capital, and they would be glad to get their 2 per cent. on that. They thought it better, however, to postpone the payment of the money for some time longer, and he hoped the shareholders would have confidence in their judgment. The board possessed one-fourth of the whole capital, and consequently they would act for the benefit of the shareholders. The money was due to the shareholders, and he hoped it would be paid to them, during his time at all events.

The motion was put and carried.

On the motion of Mr. LAMERTE, seconded by Mr. HARRINGTON, a vote of thanks was passed to the chairman for the interest which he takes in the success of the company, and the proceedings then terminated.

GAS AFFAIRS IN AMERICA.

REPORT OF THE GAS COMMISSIONERS IN RELATION TO THE SUPPLY OF GAS TO THE CITY OF BOSTON.

(*Continued from page* 288.)

Different Processes for the Manufacture of Illuminating Gas.

These may be divided into three classes—viz., processes for the manufacture of—

1. Coal gas.
2. Petroleum or naphtha gas.
3. Water gas.

Petroleum or naphtha gas may be used in combination with coal gas or with water gas. In fact, the latter is rarely made for illuminating purposes without being enriched with petroleum or naphtha gas.

The general principles of these three processes will be first briefly stated, and then their relative merits, so far as it has been possible to ascertain them, in regard to the quality of the gas, the cost of manufacture, and any peculiarities which may be characteristic of either kind of gas.

1. *Coal Gas.*—The manufacture of coal gas depends upon the principle that, when coal gas is subjected to high heat in a closed vessel, certain gases and vapours are evolved, some of which are combustible, and some, like the steam, are condensable, a residue of charcoal or coke being left behind. This process is termed destructive distillation, and this property of coal is shared by all vegetable and animal substances; but coal and petroleum are the only substances which have been used economically in the manufacture of illuminating gas in extensive works. The distillation of the coal is the most important of the operations in making coal gas, but it is necessary, before the gas is burned, to remove from it those vapours which can be condensed, such as the tar, water, &c., and also those non-condensable gases which either diminish largely the illuminating power, if left in the gas, such as carbonic anhydride (commonly called carbonic acid), or which, when the gas is burned, give rise to products of combustion which are injurious, such as sulphuretted hydrogen and ammonia. The removal of these substances necessitates two other operations—viz., condensation and purification, which, although they do not affect the theory, do affect very materially the cost of the manufacture.

The distillation of the coal is effected in an iron or a clay retort, three, five, six, or seven of which, according to circumstances, are heated with one fire of coke to a cherry-red heat (1478° to 1830° Fahr.) for iron retorts, or to an orange or white heat (2000° to 2300° Fahr.) for clay retorts; 160 to 200 lbs. of coal are usually introduced into the retort at a time, the lids closed, and the operation allowed to continue uninterruptedly for four or four and a half hours. At first the outer layers of the coal only, which are raised suddenly to a high temperature, undergo distillation, evolving vapours which contain a large amount of carbon. These, in passing through the retort, are converted into fixed gases of a high illuminating power. These outer portions of the charge are thus converted into coke, and the inner portions of the charge undergo distillation in the same way, the vapours being, however, more completely decomposed than those first evolved, on account of being brought in contact with the highly heated coke upon the outside of the charge. They are, therefore, of a lower illuminating power. This is well illustrated by the following experiment, performed with the experimental apparatus of the Boston Gas-Works, by Mr. C. D. Lamson, the engineer.*

Test, 2400 lbs. of Penn. coal; 12 clay retorts; charge, 200 lbs. each; duration, four hours; retort-valves open; one-quarter inch pressure on retorts.

Feb. 18. Time.	Gas Made each Half Hour.	Test of each Half Hour's Candle Power.
3.00	—	—
3.30	1930	19·60
4.00	2470	17·07
4.30	2140	15·73
5.00	1880	12·26
5.30	1580	10·79
6.00	1340	6·88
6.30	760	2·91
7.00	240	1·50

It will thus be seen that not only the largest amount of gas, but also the richest, is made during the first part of the distillation.

The gas thus formed passes at once from the retort through a pipe to a large horizontal pipe called the hydraulic main, which is partially filled with water, the gas usually being made to bubble up through half an inch to an inch of the water. Here some of the vapours are condensed. From the hydraulic main the gas passes to the condenser, which usually consists of a series of iron tubes surrounded with water, so as to cool it, and more completely condense the tar and other vapours, which are conducted away.

The gas is next conducted into the washers or scrubber, in order to remove the rest of the tar, and also the ammonia. These washers consist of chambers, in which the gas is brought into contact with jets of water. A scrubber is a chamber filled with brush, coke, fire-brick, or some similar material, which is kept constantly moistened with water.

The next step in the manufacture of coal gas is the purification, which serves to remove those noxious substances not taken away by condensing and washing. These substances are chiefly carbonic anhydride, and sulphuretted hydrogen. The objection to the carbonic anhydride in gas is, that it lowers the illuminating power very greatly, 1 per cent. being said to diminish the illuminating power 5 per cent. The sulphuretted hydrogen and other gaseous sulphur compounds are injurious by giving rise in burning to sulphurous and sulphuric acids, which may injure, by its corrosive action, delicate structures, such as books, gilding, silks, &c., which may be exposed to the air of a room in which the gas is burned. When coal gas was first used in England without purification, many books in the British Museum library were ruined. The ammonia is injurious in that

* *American Gaslight Journal*, April 3, 1876.

it destroys the diaphragms of the meters, injures the fixtures, and, in contact with burning gas, it is partly converted into nitric acid, which may also attack some delicate substances. The same is true of cyanogen, which is sometimes present as an impurity.

To remove these substances several methods are in use, the material employed being lime and oxide of iron. Lime is used both in the wet and dry way. The wet-lime process consists in passing the gas through milk of lime. This effectually removes the carbonic anhydride, uniting with it to form chalk, and takes away most of the sulphur compounds by uniting with the sulphur to form calcic sulphide or calcic sulphocarbonate. The wet lime is objectionable, however, on account of the very foul odour evolved from it when removed from the purifier, so that exclusive purification by the wet-lime process has been generally abandoned. The dry-lime process consists of passing the gas through moistened slaked lime placed upon trays. This is about as effective as the wet-lime process, and has generally superseded it. The Boston Gaslight Company employ both of these processes, disposing of their wet lime in such a manner that it is not a nuisance.

The iron process consists of passing the gas through some form of the hydrated sesquioxide of iron mixed with other substances. The great advantage of these mixtures is that they may be used over and over again, the sulphuretted hydrogen reducing the sesquioxide of iron to form water, free sulphur, and hydrated sulphide of iron, which last, on exposure to the air, is changed again to the hydrated sesquioxide of iron, and more sulphur is set free. We have seen a mixture of this kind which has been used very effectively for three years in the New York Mutual Company's works. This process is adopted very extensively in the European gas-works, on account of its economy, the oxide of iron used being either the native iron ores, as the "bog iron ore," or some of the artificial preparations, which are usually made by mixing copperas with lime and sawdust, and exposing the mixture to the air for a while. These iron preparations, however, do not remove the carbonic anhydride from the gas so effectually as the lime.

From the purifiers the gas passes through the station-meter, where it is measured, to the gasholder, and is ready for distribution, through the mains, to the burners of the consumer. Gas thus prepared has about the following composition :*—

Name.	Heidelburg.	Bonn.	Chemnitz.	London Common.	London Cannel.
Hydrogen	44·00	39·80	51·29	46·00	27·70
Marsh gas	38·40	43·12	36·45	39·50	50·00
Carbonic oxide	5·73	4·66	4·45	7·50	6·80
Olefiant gas and other hydrocarbons	7·27	4·75	4·91	3·80	13·00
Nitrogen	4·23	4·65	1·41	0·50	0·40
Oxygen	..	..	0·41	..	..
Carbonic anhydride	0·37	3·02	1·08	0·70	0·10
Steam	..	..	..	2·00	2·00

Of these gases the hydrogen and carbonic oxide burn with a non-luminous flame, and marsh gas burns with only a slightly luminous one, the illuminating quality coming almost entirely from the "olefiant gas and other hydrocarbons." The oxygen, carbonic anhydride, and nitrogen, being incombustible gases, injure the illuminating power very greatly. The oxygen and nitrogen get in accidentally from the admission of a little air in charging the retorts, &c. Hence, other things being equal, the larger the proportion of olefiant gas and other rich hydrocarbons present, the higher is the illuminating power, and the richer is the gas. This proportion depends chiefly upon the kind of coal used, and the temperature at which it is carbonized.

In regard to coals, we need in this report only mention that the gas coals are bituminous caking coals and cannel, and for enriching the gas there is frequently used a certain per centage of bituminous shales, such as the Boghead mineral of Scotland, and asphalte minerals, such as the Albertite of Nova Scotia, and the Grahamite of West Virginia. These enrichers are not used alone, but are mixed with the ordinary gas coal, and produce an exceedingly large amount of the luminant hydrocarbons.

The amount of gas obtained from a ton (2,240 lbs.) of good gas coal, like the Penn coal, when properly managed, is about 10,000 cubic feet of 15 or 16 candle power. The enriching coals produce a larger amount of gas of a higher candle power, and the asphalte minerals from 13,000 to 15,000 cubic feet of from 30 to 50 candle power. The value of these as enrichers is a very important question, on account of its bearing on the relative cost of enriching with coal or with naphtha.

A number of experiments have been made at the works of the Boston Gaslight Company for the purpose of testing the value of the Albertite as an enricher. At some of these, one of the members of the commission was present, and the following are the results, taken partly from the record book of the company, and partly from notes made at the time :—

Date. — 1876.	Amount of Coal Carbonized.	Yield.	Yield per lb.	Yield per Ton.	Candle Power.	Sp. Gr.	Remarks.
May 22	100 lbs.	600 ft.	6·00	13,440·0	..	..	Mixed with coke.
July 5	100 ,,	630 ,,	6·30	14,112·0	..	..	Ditto.
,, 6	100 ,,	700 ,,	7·00	15,680·0	..	..	
,, 7	100 ,,	670 ,,	6·70	15,008·0	..	..	
,, 7	100 ,,	690 ,,	6·90	15,456·0	..	..	
,, 8	150 ,,	930 ,,	6·20	13,888·0	..	..	Mixed with coke.
,, 10	100 ,,	715 ,,	7·15	16,016·0	37·91	0·624	Without coke. Argand burner.
,, 13	150 ,,	940 ,,	6·26	14,022·4	54·45	0·624	Without coke. Scotch fishtail, 45°.
,, 17	Same as July 13, left standing in holder.				38·59	..	With fishtail burner, 45°.
					36·08	..	With Argand burner.
	Average . .		6·56	14,694·4	..	..	

In addition to these, which will be alluded to later, some experiments have been tried with cannel coal. Red Bank cannel gave an average yield of 3·8 feet per lb. of 20·52 candle gas. (Sp. gr. = 0·475 to 0·500.) Mill Creek cannel yielded, in one test, 4·5 feet per lb. of 24·49 candle gas. Cannelton cannel yielded 4·74 feet per lb. of 30·40 candle power as tested with a bat's-wing burner, or 22·65 candle power as tested with a "London" Argand burner.† The specific gravity of the gas was 0·556.

The principal impurities in coal gas are, as has been mentioned above, sulphuretted hydrogen, and other gases containing sulphur and ammonia. The presence of a small amount of these cannot be avoided, and is not injurious, since the amount of the products of combustion of these substances which can be formed by the burning of gas from a single burner during an entire evening is very small. In fact, the presence of a slight amount of ammonia is beneficial, tending to neutralize the sulphurous and sulphuric acids formed by that portion of the sulphur which cannot be removed. The limit prescribed by law for the London companies is 20 grains of sulphur and 2½ grains of ammonia per 100 cubic feet.

There is quite a difference of opinion among scientific men as to the injurious effect of sulphur in illuminating gas. Thus Dr. William Odling, an eminent chemist, says in a lecture to the British Association of Gas Managers:

But, on the other hand, I am altogether at issue with the public, when they maintain that the sulphur of the gas produces, by its combustion, oil of vitriol (sulphuric acid), or that the amount of sulphur ordinarily contained in gas is of any consequence whatever; and a little consideration will, I think, satisfy you of the soundness of this opinion. We will assume that coal gas contains, not 20, but 40 grains of sulphur in 100 feet—a quantity, at any rate, greatly exceeding the reality. Now, making the extravagant assumption that the whole of these 40 grains of sulphur would be completely burned—and in reality they would be burned but very incompletely—they would furnish by this combustion 80 grains of sulphurous acid gas. This quantity of the produced sulphurous acid would occupy, at ordinary temperature, about 1-15th part of a cubic foot, and since 100 cubic feet of our coal gas gives 1-15th of a cubic foot of sulphurous acid, 1500 cubic feet of our coal gas would be required to furnish one cubic foot of the acid, even upon the extravagant assumption we have purposely made. But the combustion of 1500 cubic feet of coal gas would produce something besides sulphurous acid. It would produce, at least, 1000 cubic feet of carbonic acid, and, in addition to its dilution by other gases and vapours, we should have our sulphurous acid diluted by 1000 times its volume of carbonic acid. Now, if we can get at the proportion of carbonic acid in the atmosphere of a room highly illuminated with gas, and take the 1-1000th part of that proportion, we shall be able to form some notion of the amount of sulphurous acid present. You will remember, that the amount of carbonic acid furnished by the breath of one individual is equal to that furnished by two 5-feet gas-burners, and that the maximum amount of carbonic acid found in the atmosphere of a crowded theatre was 0·32 per cent. Now, if, in addition to our previous unreasonable suppositions, we further suppose that an atmosphere contains 0·2 per cent. of carbonic acid furnished by gas combustion, you will see that the whole matter becomes a *reductio ad absurdum*—that we might actually have one half-millionth part of sulphurous acid present in the air of a gas-lighted room. But this sulphurous acid is not sulphuric acid, and can only be converted into sulphuric acid with very much pains and difficulty. When gas is burned in special apparatus, indeed, its constituent sulphur can be converted into sulphuric acid; but it is very difficult to do this. The probability is that, of the sulphurous acid produced in ordinary combustion, scarcely a particle gets converted into sulphuric acid—certainly not more than the ammonia ordinarily existing in the atmosphere can neutralize, so as to form sulphate of ammonia instead of sulphuric acid.

Dr. Letheby, a still more eminent gas chemist, takes exception to the above statements. In the London JOURNAL OF GAS LIGHTING, Feb. 2, 1869, he says :—

And now I am desirous of making a few remarks on the effects of sulphur in coal gas. Dr. Odling has directed your attention to this matter from a statistical point of view, and has shown you how, by a mathematical process, the amount of sulphur acids in the products of burning gas may be reduced to a vanishing point, and that, therefore, they must be insignificant and wholly harmless; but I will ask you to look at the subject from another point of view, and to examine it in the light of facts as well as of figures. About 15 or 20 years ago, when I began to inquire into this matter, I was struck with a circumstance which is now, as it was then, very remarkable—namely, that wherever gas is burned continuously, and in large quantity, it causes a rapid destruction of textile fabrics, with a very acid condition of them. This is notably so in our public libraries, and in warehouses and shops. I obtained so many striking proofs of this, especially from the libraries of the Athenæum Club House, the London Institution, the College of Surgeons, and elsewhere, that I made them the subject of a special report to the City authorities in 1854, and here you will see the specimens of covers of books which were furnished to me at that time. If you apply a piece of the leather to your tongue, you will taste its acidity, and if it be treated with water or spirit of wine, and tested with a solution of baryta, it will be found that the acid is sulphuric acid. These effects were observed many years ago in the library of the Athenæum Club House, and they were growing to be so serious, that the managers requested a commission of chemists, including Dr. Prout, Mr. Aiken, and others, to inquire into it, and I have before me a copy of their report upon the subject. It is to the effect that the mischief is clearly due to the presence of sulphuric acid, which had come from the burning gas; and they state that the mischief will continue as long as gas is used in the library without proper ventilation. Mr. Faraday, thereupon, designed the system of ventilation which is still used in the library. As to the effects of the products of burning gas on shop goods, they are notorious, for such goods are regularly disposed of as damaged or gassy things. It has been remarked, too, that plants are quickly killed by the products of burning gas, for they are peculiarly susceptible of injury from the presence of sulphurous acid in the air; according to Drs. Christison and Farmer, as little as one part in 10,000 of air will kill plants in less than 24 hours. And you cannot use gas in a conservatory, either for heating or for illuminating purposes, unless the products of combustion are entirely removed. Advancing a step further in my inquiries, I ascertained that the water produced by burning gas, collect it how you will, is always acid, and will rot leather, paper, cotton, and linen. Here are specimens of such tissues, which have been dipped in the condensed liquid products of gas combustion, and you will observe that they are as rotten as tinder.

Mr. C. Heisch, F.C.S., Superintending Gas Examiner to the Corporation of the City of London, says :*

When sulphur is burned in dry air or dry oxygen, this gas (sulphurous acid) is produced; but when burned even in a slightly moist atmosphere, part is converted into sulphuric acid, and, when burned in a large quantity of hydrogen (as in coal gas), the oxidation of which produces water in large quantity, the amount of sulphurous acid gas formed is quite insignificant, nearly all the sulphur being converted into sulphuric acid—not a gas, but a vapour readily condensed on all the walls of, and articles contained in, a room, and most difficult to remove, even by a draught through the room—much less by the ordinary means of ventilation. That such is the fact, the experience of every one who notices the effect of burning gas on metallic articles, plants, &c., abundantly proves. Each grain of sulphur, in burning as it does in gas, gives rise to the production of just over 3 grains of sulphuric acid; 100 cubic feet of gas, if they contain 30 grains of sulphur (a very common amount), would in burning produce 90 grains of sulphuric acid, and three burners, each burning 4 cubic feet per hour, would produce between 3 and 4 grains of sulphuric acid per hour, or about 20 grains in six hours, which would in great part be condensed on the contents of the room in which the gas is burned. . . . All tradesmen are only too well acquainted with the rotting effects produced by gas on their goods. One most instructive instance, in proof of the above, I may mention. Some years since gas was introduced at the Royal Observatory, in place of camphine lamps, for the photographic registration of magnetic variations, &c. In a very short time the surface of every reflector was destroyed, and the draw-tubes of the telescopes quite corroded. It was found necessary to place a tube over each burner, and to connect all these with a central chimney, in which a strong draught was maintained, to carry off the products of combustion. These tubes were, for cheapness, made of zinc. In a few days all the lamps were found extinguished by a crystalline substance, which dropped on the burners from the tubes. This proved to be sulphate of zinc. I recommended the substitution of tinned copper tubes, but the price was objected to; and a contrivance was resorted to by which the condensed matter was run into a vessel at the side of the chimney. In one of these vessels I collected in six weeks, from a burner consuming about one-half foot per hour, three-fourths of a pound of sulphate of zinc.

The weight of testimony appears to us to be in favour of the injurious effects of sulphur in illuminating gas, and hence the necessity of removing all which is possible by purification.

The specific gravity of illuminating gas varies usually from about 0·400 to 0·500; that is, it is a little less than one-half as heavy as air, the specific gravity of which is taken as the unit, or 1·000. As a rule, the specific gravity of coal gas increases in nearly a constant ratio with the illuminating power; so that by knowing the specific gravity, we can tell pretty nearly what the candle power is, and *vice versâ*. Tables have been constructed for estimating approximately the candle power, from the specific gravity; but these cannot be used for any other than pure coal gas. The specific gravity of illuminating gas is a very important property, since, as has been already mentioned in describing the apparatus for determining the specific

* *American Gaslight Journal* of Dec. 16, 1875, from Professor C. F. Chandler's Address to the American Gaslight Association.

† Burners giving a flat flame yield a better result with rich gases than those giving a round flame.

* London JOURNAL OF GAS LIGHTING, Dec. 29, 1874, p. 856.

gravity, the denser the gas the more slowly will it pass through a given orifice, the pressure being the same. It has, therefore, a great influence upon the amount which passes through the consumer's meter and burner.

II. *Petroleum Gas.*—In the manufacture of this gas either crude petroleum may be used, or some of the products of the distillation of petroleum, such as naphtha, &c. In distilling petroleum various vapour are evolved, differing according to the temperature employed. Those which are volatilized at a low temperature, as rhigolene, gasolene, naphtha, &c., are of little value commercially, as compared with those which require a higher temperature, such as kerosene. They are, however, even more valuable for the manufacture of gas, and can be used more economically on account of their cheaper price.

The principles upon which the manufacture of petroleum gas depends do not differ from those of coal gas. In both cases the material is subjected to destructive distillation in the retort; but in the case of petroleum the material may either be introduced directly into the retort, or, in the case of naphtha, may first be converted into vapour, and the vapour conducted into the retort. In either case the liquid is first vaporized—in the one case in the retort, and in the other before it reaches there; and, secondly, this vapour is decomposed, and made into a fixed gas, which is conducted into a hydraulic main and condenser, in the same way as coal gas. One very great advantage in naphtha gas is, that it does not require purification, since it contains no sulphur compounds and no ammonia; hence one item in the expense of the manufacture is dispensed with. Moreover, a loss of some of the luminiferous hydrocarbons is avoided, a certain amount of these being necessarily condensed in passing through the washers, scrubbers, and purifiers.

Experiments which have been made by Professor A. Wagner* show that naphtha is a better and more economical material for the manufacture of gas than petroleum or the heavy oils. Fifty kilogrammes of petroleum produced 1547 cubic feet of gas, while the same amount of naphtha produced 1619 cubic feet. Both petroleum and naphtha produce a large amount of acetylene, a gas which contains a large proportion of carbon. In the above experiments with petroleum, the proportion of acetylene evolved was 5 per cent., of other heavy (rich) hydrocarbons 35·96 per cent., and of light (poor) hydrocarbon gas 59 per cent., the petroleum being split up with deposition of carbon into a mixture of acetylene, heavy and light hydrocarbon gas, and hydrogen.

On a large scale in gas-works in this country, where petroleum and its products are much cheaper than in Europe, it has been found that 60 to 80 cubic feet of gas can be obtained from a gallon of petroleum or naphtha, this gas having an illuminating power of from 50 to 70 candles.

The following experiments were undertaken by Mr. C. D. Lamson, at the Boston Gas-Works, one of the members of the commission being present during the performance of many of the tests, for the purpose of determining the value of petroleum as an enricher for coal gas. One of the retorts connected with the experimental apparatus was fitted with the necessary pipes for conducting petroleum or naphtha into it. The gas was conducted to one of the gasholders belonging to the company, and tested by the photometer described above, with the following results:—

Crude Petroleum.

Date.	Amount Carbonized.	Yield.	Yield per Gallon.	Candle Power.	Name.	Sp. Gr.
April 5	48 galls.	4000 ft.	83·5 ft.	..	..	..
,, 6	33 ,,	2500 ,,	75·75 ,,	..	..	..
,, 8	50 ,,	2700 ,,	50·4 ,,	..	..	..
,, 10	44 ,,	3300 ,,	75·0 ,,	..	..	..
,, 11	43 ,,	3300 ,,	76·74 ,,	..	..	..
,, 12	42 ,,	3400 ,,	80·95 ,,	..	..	..
,, 17	40 ,,	3000 ,,	75·0 ,,	..	..	..
,, 24	30 ,,	2000 ,,	66·6 ,,	..	..	..
				37·11	Argand	..
May 4	15 ,,	1200 ,,	80·0 ,,	49·30	Scotch fishtail, flat of flame.	..
				40·88	,, edge ,,	..
,, 6	40 ,,	2800 ,,	70·0 ,,	..	..	..
,, 8	37 ,,	2700 ,,	72·9 ,,	..	..	..
				51·88	Scotch fishtail, flat . . .	..
,, 11	80 ,,	5200 ,,	65·0 ,,	49·78	,, 45° . . .	..
				45·44	,, edge . . .	0·600
,, 20	34 ,,	2500 ,,	73·4 ,,	..	..	..
Average . . .			72·71 cubic feet to one gallon.			

Naphtha.

Date.	Amount Carbonized.	Yield.	Yield per Gallon.	Candle Power.	Burner.	Sp. Gr.
				60·64	Fishtail, flat of flame . .	..
May 9	..	..	..	57·66	Scotch fishtail, flat of flame.	..
				58·60	,, edge ,,	..
				65·76	,, 45° ,,	0·900
				57·10	,, edge ,,	..
,, 10	18 galls.	1200 ft.	66·6 ft.	63·60	,, flat ,,	..
				64·80	,, 45° ,,	..
	Same			57·69	,, flat ,,	..
,, 12	gas after standing	..	..	54·11	,, 45° ,,	..
				42·81	,, edge ,,	..
				35·73	,, flat ,,	..
,, 13	8 galls.	700 ft.	87·5 ft.	33·41	,, 45° ,,	..
				31·33	,, edge ,,	0·644
,, 17	10 ,,	800 ,,	80·0 ,,	66·00	,, 45° ,,	0·647
				+35·08	,, flat ,,	..
,, 18	10 ,,	800 ,,	80·0 ,,	64·18	,, ,, ,,	..
				62·70	,, 45° ,,	..
				51·51	,, edge ,,	0·850
,, 19	18 ,,	1500 ,,	83·3 ,,	..	..	..
Average . . .			79·49 cubic feet to one gallon.			

† During the performance of this experiment, the first test was made while the stream of naphtha flowing into the retort was very small, so that the rich hydrocarbons formed were probably still further decomposed with deposition of carbon and the formation of lighter hydrocarbons, thus diminishing the candle power. Upon turning in a larger stream, the candle power at once increased. This is also the probable explanation of the low illuminating power of the gas made on May 13, the amount of gas made being increased at the expense of the light.

There was not a sufficient number of experiments made with crude petroleum to enable us to draw definite conclusions in regard to anything but the yield. It will be seen, however, that it is somewhat inferior in this respect to naphtha, a gallon of crude petroleum yielding 72·71 cubic feet of gas = 3053.82 cubic feet to the bbl., while a gallon of naphtha yielded 79·49 cubic feet = 3338·58 cubic feet per bbl.*

According to Mr. J. D. Patton,† about 70 feet of 80-candle gas, or 80 cubic feet of 70-candle gas to the gallon is the maximum yield from petroleum or naphtha. When such gas as that obtained from pure Albertite, petroleum, or naphtha is burned, a much smaller burner than that in ordinary use must be employed; otherwise the flame will smoke and much light be lost, although less of any of these gases than of ordinary coal gas would pass through the same burner in a given time, on account of their greater specific gravity.

(To be continued.)

* *American Gaslight Journal*, Dec. 16, 1875, from Dingler's "Polytechnic Journal," vol. ccxvii. p 64.

* A petroleum bbl. contains 42 U.S. gallons. A barrel of naphtha usually contains from 45 to 47 gallons; but the calculations here made are for 42 gallons per bbl., the same as in the case of petroleum.

† *American Gaslight Journal*, Nov. 16, 1875.

GLASGOW CORPORATION GAS-WORKS.

Annual Soirée of the Employés.

This Annual Festival was held in the City Hall, on Tuesday evening, the 13th inst., and was well attended. Councillor Miller presided, and there were present on the platform Bailies Ure and Thomson; Councillors Moir, Waddell, Clark, Burt, Martin, Garvie, Farquhar, Selkirk, Mathieson, and Dron; Messrs. Foulis, Ross, Bowers, Granger, Manuel, Davidson, Key, Scott, Lyon, &c. After tea,

The Chairman addressed the meeting. He remarked that all present were connected with one large concern, and he had to congratulate the whole of them that the past had been a very prosperous year. Everything, so far as he had heard, had gone on exceedingly well. They had had very few complaints indeed from the public, either as to bad gas or anything else. The fact was, he supposed, the public had got rather tired of complaining—possibly they found it was not of much use, for they were all doing the best they could. There could be no doubt they had all done remarkably well. He knew that the stokers had done their duty. They had performed a very large amount of work, which, from personal experience, he knew was hard work. He had himself been a stoker for ten years, and knew how to charge and draw retorts; he had done so more than a hundred times. There was another department of which he would like to say a word, and that was the department which sent out the accounts and brought the money in. The money had come well in last year, even although trade was dull. He believed there had not been more than one complaint in connexion with the ingathering of the cash. He could assure the public that whilst they were always anxious to get in the money like other people, yet they treated their customers as leniently as possible; but there was one complaint recently made as to incivility. He thought that in matters of that kind there were faults on both sides. He was quite sure every member of the Corporation and the Gas Committee wished that perfect civility should be shown by all their servants to the public outside, no matter whether the account was one shilling or for ten pounds. He was glad to announce that there had been no serious accident during the year just closed, and that was something for which they should all be thankful. He thought it might be interesting to them to know that last year there were 178,359 tons of coal carbonized in the works of the corporation; the men employed in the works numbered upwards of 1000, and in the other departments 400. The greatest quantity of gas which had been manufactured in one day last year was 9,660,000 cubic feet, while for the year preceding the greatest quantity was 8,898,000 cubic feet, so that there was a considerable increase in the past twelve months. During the seven years that the corporation had carried on the works, the quantity of gas manufactured had increased by no less than 44 per cent. He afterwards referred to the question of Sunday labour, and said that since last annual gathering the committee had arranged that all the men should get twelve clear hours off on Sunday. That had not been done without great disadvantage and at very considerable loss to the public. He rejoiced to hear that the men in general were pleased with the change, though he regretted to understand that some of them did not avail themselves of the benefit which had been conferred. The committee desired that these twelve hours should be to the men a time of rest both to their bodies and to their spirits, and he hoped they would see it to be their interest to take full advantage of the arrangement which had been made.

Messrs. Moir and Waddell subsequently addressed the meeting, and musical performances enlivened the proceedings of the evening.

RIVER SUPPLY WATER-WORKS FOR GLASGOW.

The Water Commissioners of Glasgow are at present engaged in the construction of important water-works on the lands of Westhorn, about three-quarters of a mile above Dalmarnock Bridge, the object being to give a supply of water from the upper reaches of the Clyde to those manufacturers who now draw from the river lower down. The subject of a water supply from the Clyde has for more than half a century been a bone of contention between the Clyde Trustees, the Water Commissioners, and some sixteen manufacturers who claim a right to draw their water from a certain part of the river. When the removal of the weir above Hutchesontown Bridge was first mooted, the manufacturers were up in arms, and objected to such a step, on the ground that it would allow the foul water from the city sewers to be carried by the tide up the river, to the injury of their respective industries. This question formed the subject of a protracted litigation. The Clyde Trustees and the Water Commissioners contended that the manufacturers had no legal standing, while the manufacturers, on the other hand, maintained that the weir could not be removed without their consent, or at all events, unless due provision were made for giving them an equivalent supply of water from some other source. In the Court of Session a decision was ultimately given against the manufacturers; but, on appeal to the House of Lords, this judgment was reversed, and the legal claim of the manufacturers established. In view of this decision, there was no alternative but either to abandon the idea of removing the weir, or else to make arrangements for another supply of water. The former course was not to be thought of in face of the advice of every engineer consulted during 50 years; and although the proposed improvement met from time to time with strong opposition, both in the Town Council and elsewhere, (urgent representations being made on behalf of the amenity of the Green, and in the interest of East-enders fond of boating and bathing) other considerations ultimately prevailed, and it was finally resolved that the scheme should be proceeded with as speedily as possible. Hence the necessity for constructing the works now in question.

The operations, which are under the superintendence of Mr. Gall, engineer to the Water Commissioners, were commenced several months ago, and they are now so far advanced that the new supply is expected to be available towards the end of June or the beginning of July ensuing. The engine-house, which forms an important feature of the undertaking, is situated close to the banks of the river, in the immediate vicinity of what is known as Harvie's dyke, while on the high ground, a little beyond, the finishing touches are being given to a couple of reservoirs, each capable of

holding 7½ million gallons of water. The pumping apparatus consists of two large condensing, horizontal, direct-acting engines, made by Messrs. Rait and Lindsay, Glasgow. These machines are furnished with all the latest improvements, and are calculated to be capable of raising 7½ million gallons in 20 hours to the height of about 65 feet. The object of providing reservoirs is to ensure that the supply shall be continuous, and to admit of any necessary repairs being made on the engines without in any way interfering with the mills dependent on these works. The water will be carried from the reservoirs in a 42-inch main, to be laid along the edge of the river, to Springfield Road, passing by Adelphi Street, through the Green, under the river opposite Little Govan Street, and on to the Commercial Road. The main will be carried past all the large public works interested in the supply. The price of the water to the sixteen manufacturers immediately concerned has been fixed at 5s. 6d. per 100,000 gallons; but the commissioners have been left free to sell any extra quantity they may raise to other manufacturers, at a more remunerative price. It is provided by statute that the weir shall be removed within three months after the completion of these works, so that by the end of August or beginning of September this structure, about which there have been so many disputes, will have become a matter of history.

As to the effect of the removal of the weir on the navigation of the river, those best able to judge anticipate that the increased scour thus obtained will tend to deepen the bed of the river, and so facilitate navigation to Rutherglen, if not to Carmyle. To get the full benefit of this water-way, however, the Clyde Trustees would require to commence dredging operations. At present the trustees exercise no jurisdiction above Hutchesontown Bridge, and the question suggests itself whether it would pay to push their system of improvement into the higher reaches. If, however, there seems to be a reasonable prospect of floating vessels of 5 or 6 feet draught as far up as Carmyle, the spirit of progress which has already done so much for the Clyde will probably not be found wanting, and ere long we may see five or six miles added to the navigable channel of this important river.

The cost of the River Supply Works, including the ground occupied, is estimated at between £80,000 and £90,000.—*Scotsman.*

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

During the week some descriptions of local and other pig iron have hardly been so firmly held—a fact which may, to a certain extent, be attributed to the weak state of the Scotch market, and the very heavy stocks held at Glasgow and elsewhere in Scotland. Foundry brands are, perhaps, better maintained in price than the forge numbers.

In the manufactured iron trade there is little or no change to be noted, nor is any great variation in prices to be noted either in respect of ordinary merchant irons or of pipe work and other castings. Pipes can be had at about £5 to £5 10s. per ton, and ordinary casting at from £6 10s. to £8.

All classes of fuel remain very plentiful and cheap—good gas coal being obtainable at 6s. to 8s. per ton, steam coal 9s. to 10s. 6d., ordinary engine coal 3s. to 5s., and house coal 10s. to 25s. per ton.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

For all classes of round coal there is still only a very poor demand, and both for house fire and gas-making purposes supplies are abundant in the market, and both house coal and gas coal collieries have been put on short time, many of them not running more than seven and eight days to the fortnight. Prices generally are weak, and there is a great deal of underselling in the market. For good Arley coal it is difficult to obtain more than 10s. to 10s. 6d. per ton at the pit. Pemberton four-feet is quoted at 8s. 6d. to 9s., and the common Wigan seams are offering at prices ranging from 6s. 6d. to 7s. 6d. per ton, according to quality.

The iron trade continues in a very depressed condition, and Lancashire smelters, in the face of the extraordinarily low prices at which north country brands are offered in this district, are completely shut out from any chance of securing orders, except at prices which would be considerably short of covering the actual cost of production. For Lancashire pig iron delivered into the Manchester district, makers are still quoting 56s. 6d. to 57s. 6d. per ton for No. 3 foundry, and 54s. 6d. to 55s. 6d. per ton for No. 4 forge; but at these figures little or no business can be done. Finished iron is also very flat, and for delivery into the Manchester district, quotations range about £6 15s. to £6 17s. 6d. per ton for Lancashire bars, £7 17s. 6d. for hoops, £8 15s. for ordinary plates, £9 5s. for best boiler-plates, and £9 5s. per ton for sheets.

THE COAL AND GENERAL TRADE OF THE NORTH.

(FROM OUR OWN CORRESPONDENT.)

The coal trade of the North of England continues in a very unsatisfactory condition from week to week. The near approach of spring brings no improvement in business; neither has the sudden appearance of cold weather had much effect upon the value of house coals. The best gas collieries are very well engaged—it may be said are fully employed. The difference between best and second gas coals being little more than 1s. or 1s. 6d. per ton, however, and freight being the same, foreign gas companies prefer best to second sorts. Second-class gas coals, therefore, occupy a very middling position in the market. There is an abundance of steam tonnage to carry on all the gas coal trade to coasting ports which have depth of water enough for steamers. Under these circumstances small sailing ships are in limited request in the gas coal trade, and freights are poor. Steamers are paid little more than 4s. per ton to carry coals to London, and other ports are pretty much in the same proportion.

March, like February, threatens to be a very anxious month for all persons connected with shipping business, exports, and continental trade. The travellers for large houses are returning from the Continent, and are giving a most disheartening account of the state of business there. If peace were assured, no doubt a very lively business would soon arise; but the military idea is so dominant on the Continent, that all sort of persons connected with trade are in anxiety lest hostilities should occur in March or April, and throw everything into confusion. The same reports come from Vienna, Berlin, St. Petersburg, and all the great cities which transact business with this part of Great Britain. The orders come to hand are intended to meet immediate wants, and no more. The trading steamers from the Tyne to the Continent are about one-half the usual number, and load up very poorly.

The iron trade of the North of England is extremely quiet. Iron shipbuilding is probably the best employed, but much of that is of a speculative character. There is no actual demand for iron shipping anywhere, and shipowners are at their wits end to know where to place them to make a reasonable freight.

A large number of seamen and stokers generally employed aboard steam vessels are ashore out of employment. House building is falling off, and, generally speaking, there is a large number of unskilled labourers out of work in the North of England.

The chemical trade of the Tyne is in a very moderate state. There are considerable sales, but at very low prices, of bleaching powder, which is sent to the paper-makers in Switzerland, France, Sweden, and Germany; but other sorts are not inquired after.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

Dr. Wallace's report upon the Glasgow gas for the week ending the 17th of February shows pretty fair results. Over the four testing-stations the average ranged from 25·85 candles to 27·82 candles, the highest maximum being 28·60 candles, and the highest minimum 27·31 candles.

Perth gas during the same week showed, in three experiments, an illuminating power of—maximum, 28·63 candles; minimum, 28·35 candles; and average, 28·49 candles.

At the usual monthly meeting of the Forfar Corporation Gas Commission, held last Monday evening, it was recommended by the Gas Committee that, in respect that from information received it appeared likely that first-class cannel would rise in price before April, when the corporation take their annual contracts for coals, 700 tons of gas coal be contracted for. The meeting instructed that the matter be delayed for a month till estimates had been received. It was stated that the illuminating power of gas in Forfar was 26 candles; and it was further stated, with reference to some complaints about the gas, that these were in a great measure caused by defective fittings and old burners, and also from the mains being too small to supply the large factories. Probably next month a proposal would be made to supply the factories of Messrs. Laird (Canmore) and of Messrs. John Lowson, Jun., and Co. from independent mains, which would considerably relieve the pressure.

At this stage I may mention that the somewhat notorious slander case, Rutherford against Lowson, which had been in the Court of Session for a number of months, has been compromised and taken out of Court. It arose out of strong statements that were made in the month of May, 1876, at a meeting of the Forfar Gas Commissioners, and the pursuer, Mr. Rutherford, asked for damages of £1000. On the understanding that the case should be taken out of Court, the defender, Bailie Lowson, agreed to pay to the pursuer the sum of ten guineas in name of damages, as also the expenses incurred in bringing the action.

At a special meeting of the Hamilton Town Council, held last Tuesday, a rather unpleasant scene took place on the question of the Corporation gas accounts for the year ending March, 1876. Members of the Gas Committee stated in the public meeting of the council that they were not able to understand the accounts, and then they proceeded to fight out their misunderstandings. Eventually, it was resolved, on the motion of Bailie Cassels, that an accountant should be employed to draw up a correct balance. In taking such action, the mover did not wish it to be understood that he threw any reflection on Mr. Dunlop, the manager, who, if he attended to the work outside, could not be expected to attend to the books also. Consideration of several recommendations by the committee, including one to increase the capital account by £17,000, and another to reduce the price of gas by 5d. per 1000 cubic feet, was adjourned.

There is a marked tendency just now to invest capital in gas and water stocks, and the consequence is that the prices of the same are advancing. Aberdeen gas shares changed hands on Friday at 6¼, which represents an advance of 5s., and on Tuesday last Glasgow Corporation £4 Water Annuities were taken at a rise of 7s. 6d., at 102⅜.

The Greenock Water Trustees held their usual monthly meeting last Monday, when it was reported that on the 27th ultimo the quantity of water in the reservoirs was 514,863,630 cubic feet, or 147 days supply for all purposes.

On the suggestion of the Water Committee of the Cupar Police Commission, it has just been resolved to borrow a further sum of £3000, on terms of the Local Water Act.

There is now some prospect that the promoters of the Perth Water Bill, now before Parliament, may arrive at a compromise with the opponents of that measure. It is difficult to see how it could pass both Houses of Parliament in the face of the opposition raised by the Water Commissioners, the Town Council, the Police Commissioners, and the Guildry Incorporation. If withdrawn, it is probable that a Bill more generally acceptable will be promoted by the city authorities in the session of 1878. At a meeting of the Water Commissioners, held last Tuesday evening, it was reported that a vote of the ratepayers had been taken in regard to the present water supply, and to the Bill now in Parliament, and that by an immense majority satisfaction in favour of the former was expressed, and opposition against the latter approved of. Messrs. Hawksley and Leslie's report upon Mr. Bateman's scheme was discussed at some length.

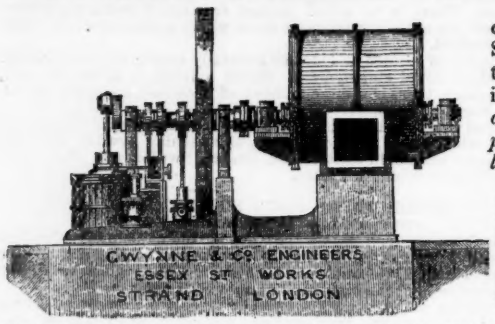
Since last report there has been an almost daily decline in the price of pig iron in the Glasgow market:—Monday, 56s. 3d. to 56s. 1½d.; Tuesday, 56s. 3d.; Wednesday, 56s. 2d. to 56s. 1½d.; Thursday, 56s. to 55s. 10d.; Friday, closing at 55s. 7d., at which sellers remained. Several brands of shipping iron have been officially reduced in price, and others are expected to follow. Special brands are now within a trifle of what were the standard quotations previous to 1871, when the great rise began. There is a fair demand for manufactured iron, and the mills are generally well employed.

A dull inanimate tone still continues to characterize the coal market, the business passing being very limited. Prices are nominally unaltered, but, where orders are scarce, reductions are made on current rates.

D. BRUCE PEEBLES & CO.,
ENGINEERS,
FOUNTAINBRIDGE WORKS, EDINBURGH,
MANUFACTURERS OF WET AND DRY GAS-METERS;
Patentees and Sole Manufacturers of "PEEBLES' GAS-GOVERNORS,"
FOR STATIONS, DISTRICTS, DWELLING-HOUSES, AND PUBLIC LAMPS,
OF WHICH UPWARDS OF 90,000 ARE NOW IN SUCCESSFUL USE.
"These Lamp-Governors are so superior that they are likely to supplant all others."—*Dr. Wm. Wallace, F.R.S.E., F.C.S.*

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, and TWO MEDALS at the PHILADELPHIA EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS;
Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

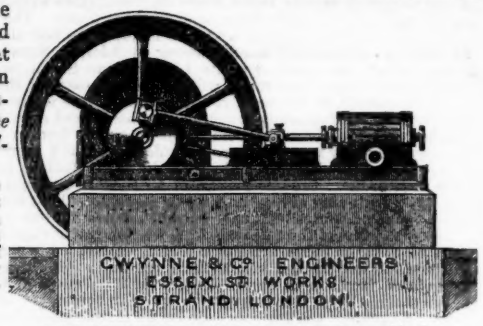
GWYNNE & BEALE'S PATENT GAS-EXHAUSTERS & ENGINES.



EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 7,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



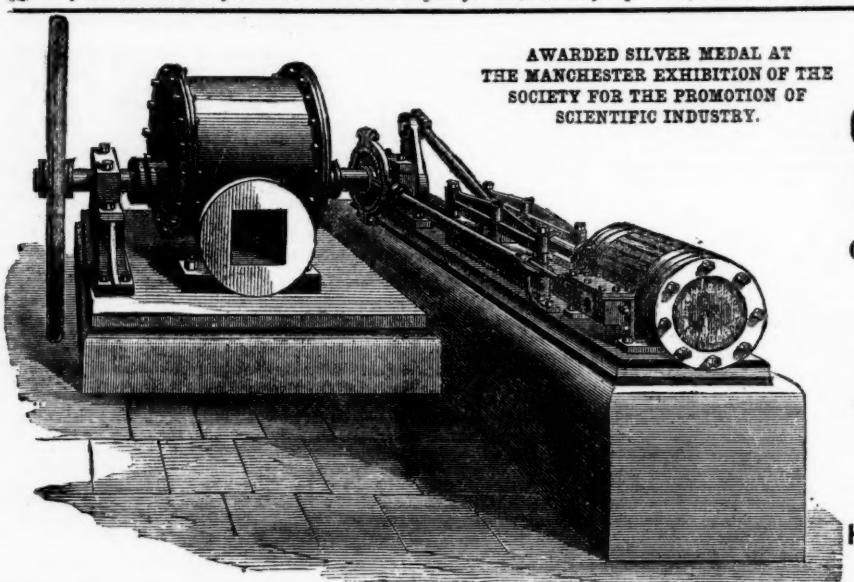
52,500 EXHAUSTER, with Horizontal Engine combined.

GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas without oscillation or variation in pressure.
Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers,
ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

☞ *G. & Co. are now making 6 Sets Exhausters and Engines for 105,000 cubic feet per hour, 3 Sets 180,000 Exhausters and Engines, with many others of all Sizes.*



AWARDED SILVER MEDAL AT THE MANCHESTER EXHIBITION OF THE SOCIETY FOR THE PROMOTION OF SCIENTIFIC INDUSTRY.

BEALE'S
Improved Patent
GAS-EXHAUSTERS
WITH
ENGINES COMBINED.

Sole Makers,
GEORGE WALLER & CO.

Makers of
ENGINES, EXHAUSTERS,
INDEX and DISC GAS-VALVES,
HYDRAULIC MAIN VALVES,
BYE-PASS VALVES,
TAR, LIQUOR, and other PUMPS,
SCRUBBERS and PURIFIERS,
CONDENSERS, BOILERS, &c.

PHŒNIX ENGINEERING WORKS,
HOLLAND STREET, S.E.,
AND
STROUD, GLOUCESTERSHIRE.

TO GAS-METER MANUFACTURERS.

WANTED, by a competent and experienced man, a situation as DRY GAS-METER PROVER. Many years at the business.
Address A. B., No. 1, Shrubland Grove, DALSTON, E.

WANTED, a situation as Manager of a Provincial Gas-Works, by a thoroughly practical and competent man. Well up in construction, manufacture, and distribution. Good testimonials and security.
Address N. R. G., care of Mr. J. Biffen, Trunk Maker, Davies Street, Oxford Street, LONDON, W.

METER REPAIRER.

WANTED, at the Reading Gas-Works, a steady and experienced METER REPAIRER. Used to both Wet and Dry Meters. The situation is a permanent one.
Apply, stating age, experience, and wages required, to Mr. E. BAKER, Engineer.

FOR SALE, a Set of 6-in. Vertical CONDENSERS, with tar-box and all connexions complete.
May be seen, and price obtained, on application to the Southbank and Normanby Gaslight and Coke Company, Limited, Southbank, YORKSHIRE.

TO BE SOLD, Four Cast-Iron Purifiers, 6 ft. square, with hydraulic centre-valve; also 10 in. by 18 in. round, and 62 in. by 15 in. round Retort Mouthpieces, and 47 in. by 6 in. H-Pipes.
Apply to W. WINSTANLEY Manager, Gas-Works, NEWCASTLE-UNDER-LYME.

HAMPTON COURT GAS COMPANY.

TO BE SOLD cheap, as they stand, Four Cast-Iron PURIFIERS, 8 feet square, with wrought-iron covers, wood sieves, columns, girders, and lifting apparatus complete; and 8-inch Hydraulic Centre Valve and connexions, all in good condition.
Apply to Mr. E. PRICE, Engineer, Gas-Works, HAMPTON WICK.

REQUIRED, as Superintendent or MANAGER, in small Manufacturing Works near London, a gentleman who has held a similar position, and is practised in the control of workmen, and who is a good accountant.
Apply, giving particulars of last engagements, to N. J. P., Messrs. Deacon's, 154, LEADENHALL STREET, E.C.

GASHOLDER FOR SALE.

THE Directors of the City of Durham Gas Company are prepared to received TENDERS for the purchase and removal of a 70 ft. by 20 ft. Single-Lift GASHOLDER, with 6 Cast-Iron Tripods. Contractor to bear every expense connected with the transaction.
Tenders, sealed and endorsed "Tender for Holder," to be lodged with me on or before Wednesday, the 7th day of March, 1877.
JOHN SUMMERS, Secretary.

CHIGWELL, LOUGHTON, AND WOODFORD GAS COMPANY.

THE Directors are desirous to receive TENDERS for the surplus TAR and AMMONIACAL LIQUOR produced at their works for a term of One year, from the 1st of March next. Quantity about 1600 gallons of each.
Tenders to be sent in separately for Tar and Water, at per ton of 2240 lbs., before the 8th of March next.
By order,
Feb. 27, 1877. E. J. HOLWELL, Secretary.

TO CONTRACTORS AND OTHERS.

THE Directors of the Watford Gas and Coke Company are prepared to receive TENDERS for Telescoping a GASHOLDER, at their Works near the Bushey Station, the drawings and specifications relating to which can be seen on application to the Company's Engineer, H. E. Jones, Esq., 203, Wapping, London.
Tenders to be sent to the Company's Office, 5, Derby Road, Watford, on or before the 12th of March, 1877.
The Directors do not bind themselves to accept the lowest or any tender.
Dated the 22nd day of February, 1877.
By order,
WILLIAM ROWELL, Secretary.

DRAUGHTSMAN.

THE Gas Committee of the Halifax Corporation require the services of an efficient DRAUGHTSMAN. One who has had experience in gas apparatus preferred.
Applications, stating salary expected, and enclosing testimonials and references, to be sent to the Town-Clerk, Town-Hall, Halifax, endorsed "Application for Draughtsman," on or before Thursday, the 1st of March next.
Further information may be obtained from the undersigned. W. CARR, Gas Engineer.

HEBDEN BRIDGE GAS COMPANY.

THE Directors of the above Company are prepared to receive TENDERS for the construction and erection of Scrubber, Condensers, Engine, Exhauster, &c., and connexions for same.
Plans may be seen and all particulars obtained from Mr. Blackburn, Manager, Gas-Works.
Sealed tenders, endorsed "Tender for Scrubber, &c.," to be sent in not later than March 7th, and addressed to the Chairman, Gas-Works, Hebden Bridge.
The Directors do not bind themselves to accept the lowest or any tender. By order,
THOMAS HORSFALL, Secretary.
Gas-Works, Hebden Bridge, Feb. 16, 1877.

THE Swansea Gaslight Company have for immediate SALE, the following Plant:—
A 6-h.p. Patent Trunk Engine. (Beale.)
Exhauster to pass 15,000 feet per hour. (Beale.)
An 8-h.p. Grasshopper Engine. (Easton and Amos.)
Exhauster, 20,000 ft. per hour. (Beale.)
Tar, Liquor, and Water Pumps, Eccentrics, Shafting, and Driving Pulleys.
Wrought-iron Condenser, six vertical Legs, 30 ft. high, 24 in. by 6 in., with tar-boxes, dips, and syphons.
A set of four cast-iron Purifiers, 12 ft. square by 5 ft. deep, with galvanized wrought-iron covers, lifting apparatus, four tiers of wooden sieves, 10-in. connexions and valves.
May be seen at the Gas-Works, Swansea. The whole in perfect working order; replaced by plant of larger dimensions.
Further particulars may be obtained on application to Mr. THORNTON ANDREWS, SWANSEA.

GAS PLANT.

THE Town Council of Richmond, Yorkshire, are prepared to receive TENDERS for the supply and erection of Retort Mouthpieces, Stand-Pipes, Hydraulic, Condenser, Scrubber, Purifiers, Iron Roof, &c.

Plans and specifications can be seen on application to me, and sealed tenders, endorsed "Tender for Gas Plant," to be forwarded on or before the 9th day of March, 1877, to

EDWARD MASON, Chairman of Gas Committee.

Richmond, Yorkshire, Feb. 22, 1877.

THE Directors of the Morpeth Gas Company are prepared to receive TENDERS for the construction and erection complete, upon their premises, Morpeth, of a Single-Lift GASHOLDER, 60 feet diameter and 20 feet deep.

Drawings and specification may be seen, and further particulars obtained, at the Gas-Works.

Tenders, sealed and endorsed "Tender for Gasholder," to be sent in not later than Wednesday, the 7th day of March, 1877, addressed to J. MILLARD, Esq., Secretary, Gas Company, MORPETH.

The tender lowest in price will not necessarily be accepted.

TO GASHOLDER MAKERS, IRON MERCHANTS, AND OTHERS.

THE Phœnix Gas Company have for SALE a Telescope GASHOLDER, 150 ft. diameter by 18 ft. deep, each lift, with its guide framing of cast-iron columns and girders. The columns 18 in. annular, and each 35 ft. high, with an average diameter of 1 ft. 10 in.

Further particulars, and permission to see the Holder, may be obtained by application to Mr. Woodall, at the Vauxhall or Bankside Stations.

Tenders to be sent in before noon on Wednesday, the 8th of March, endorsed "Tender for Old Gasholder," and addressed to the undersigned.

The Directors do not bind themselves to accept the highest or any offer.

I. A. CROOKENDEN, Secretary.

70, Bankside, Feb. 22, 1877.

LYTHAM IMPROVEMENT COMMISSIONERS.

TO GASHOLDER MAKERS.

THE Gas Committee of the above Board are prepared to receive TENDERS for the supply and erection, at their Gas-Works, of a Single-lift GASHOLDER, 60 feet diameter by 16 feet deep, in cast-iron tank.

Plans and specifications may be seen on application to Mr. Thomas Bower, Manager, Gas-Works, Lytham, and any further particulars may be had on application to Mr. A. Fleming, Scale Ford, Lancaster, to whom tenders must be sent under cover, endorsed "Tender for Gasholder and Tank," not later than Thursday, the 1st day of March next.

The Committee do not bind themselves to accept the lowest or any tender.

By order of the Committee,

THOS. BOWER, Gas Manager.

Lytham, Feb. 7, 1877.

STOCKPORT BOROUGH GAS-WORKS.

CONTRACT No. 13.

THE Gas Committee of the Corporation are prepared to receive Drawings, Specifications, and TENDERS for the following, required at their New Works, Portwood—viz., a Condenser, with 20-inch diameter connexions, valves, &c., fixed complete; one or a pair of Exhausters, with 20-inch diameter connexions, pipes, valves, &c., fixed complete; also a Scrubber, with 20-inch diameter connexions, pipes, valves, &c., fixed complete. Each to be of the minimum capacity of 120,000 cubic feet per hour.

Particulars may be obtained from the Engineer.

Tenders, &c., to be sent in on or before Wednesday, March 7th, addressed to the Chairman of the Committee, and properly endorsed with the number of the contract.

By order,

JAS. JACQUES, Engineer and Manager.

Millgate Works, Feb. 23, 1877.

Now ready, price One Shilling, No. 4 (to be continued Monthly) of

A TREATISE ON THE SCIENCE & PRACTICE

OF THE

Manufacture and Distribution

OF

COAL GAS.

LONDON: WILLIAM B. KING, 11, BOLT COURT, FLEET STREET,

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For the convenience of persons resident in remote districts, arrangements have been made by the Publisher to forward the "Treatise" by Post, securely packed on a roller, at the cost of the number and postage only—viz., 1s. 2d. Monthly, or 7s. for the Half Year.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

Meter Works in London—2, CROSS STREET, WILDERNESS ROW, E.C.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.

THE DIAMOND
ROCK-BORING COMPANY,
LIMITED,

CONTRACTORS, ARTESIAN WELL BORERS AND SINKERS.

Gold Medal for Rock-Boring Machinery . . . . Exhibition, 1873.
Silver Medal for „ „ . . . . Falmouth, 1875.

This Company now undertake the Sinking of Artesian Wells. Their system rivals all others, both for efficiency and speed, and in addition produces "Solid Cores" from the Rocks bored through, thus giving invaluable evidence of the strata passed through as the work progresses.—*Vide Brewers Journal, Oct.*, 1876, *and other papers.*

OFFICES:

2, WESTMINSTER CHAMBERS, LONDON, S.W.

SURREY CONSUMERS GAS COMPANY.

NOTICE is hereby given that the HALF-YEARLY ORDINARY GENERAL MEETING of the SHAREHOLDERS of this Company will be held at the Terminus Hotel, London Bridge, Southwark, on TUESDAY, the 3rd day of April next, at Three o'clock in the afternoon precisely, to receive the Directors Report for the half year ending the 31st of December last, to declare a Dividend, and to elect two Directors in the room of Stephenson Clarke, Esq., and Benjamin Duvall, Esq., who offer themselves for re-election, and one Auditor in the room of Nathaniel James Powell, Esq., who also offers himself for re-election.

The Books for the Transfer of Shares will be closed on Monday, the 19th of March, until the day of Meeting.

W. P. BODDY, Secretary.

Rotherhithe, Feb. 20, 1877.

PAMPHLET ON GAS.

COOKING AND HEATING.

HINTS ON GAS-BURNERS, &c.

For GAS COMPANIES to distribute to their Gas Consumers.

Specimen Copy by post Threepence, from the Author,

MAGNUS OHREN, Gas-Works, Sydenham, S.E.

TO GASHOLDER MAKERS.

THE Town Council of the Borough of Bury are prepared to receive TENDERS for a Two-lift Telescopic GASHOLDER, 120 feet diameter by 35 feet deep.

Plans, specifications, and other particulars may be obtained on application to Mr. Kelsall, at the Gas-Works, Elton, Bury, Lancashire.

Sealed tenders, addressed to his Worship the Mayor, Gas-Works, Bury, endorsed "Tender for Gasholder," to be sent in on or before the 8th day of March next.

The Council do not bind themselves to accept the lowest or any tender.

By order,

F. BULL, Town-Clerk.

Corporation Offices, Bank Street, Bury, Lancashire, Feb. 6, 1877.

LLANELLY GAS-WORKS.

TO CONTRACTORS, BUILDERS, AND OTHERS.

CONTRACT No. 1.

THE Directors of the Llanelly Gaslight Company are prepared to receive TENDERS for the excavating and building of a Brick TANK, 92 ft. diameter and 25 ft. deep.

Drawings and specifications may be seen on application at the Gas-Works, Llanelly.

Sealed tenders to be sent in on or before Friday, March 2nd, addressed to the Chairman of the Gas Company, and endorsed "Tender for Tank."

The Company do not bind themselves to accept the lowest or any tender.

Further particulars may be obtained from the Engineer.

By order,

HENRY R. MARTIN, Engineer.

LLANELLY GAS-WORKS.

TO GASHOLDER MAKERS AND OTHERS.

CONTRACT No. 2.

THE Directors of the Llanelly Gaslight Company are prepared to receive TENDERS for the supplying, fixing, and completion of a GASHOLDER, 88 ft. diameter and 25 ft. deep, with all necessary guides, wheels, columns, and girders complete, to be erected at their Works, Llanelly.

Drawings and specifications may be seen on application at the Gas-Works, Llanelly.

Sealed tenders to be sent in on or before Friday, March 2nd, addressed to the Chairman of the Gas Company, and endorsed "Tender for Gasholder."

The Company do not bind themselves to accept the lowest or any tender.

Further particulars may be obtained from the Engineer.

By order,

HENRY R. MARTIN, Engineer.

SKELMERSDALE GAS-WORKS.

CONTRACT No. 1.

THE Skelmersdale Local Board are prepared to receive TENDERS for the erection at Skelmersdale of the Retort, Purifying, and Manager's Houses, Offices, Chimney, &c., and the various works more particularly set forth in the plans, specification, and details which may be seen, and bill of quantities, form of tender, &c., and all information obtained (on payment of two guineas, which will be returned on receipt of a *bonâ fide* tender), on application to Messrs. Goodison, Atkinson, and Forde, Engineers to the Local Board, Orange Court, 35A, Castle Street, Liverpool.

Sealed and endorsed tenders to be sent to the Clerk's Office on or before the 12th day of March next.

The Board do not bind themselves to accept the lowest or any tender.

WILLIAM PARR, Solicitor, Clerk to the Board.

Ormskirk, near Liverpool.

SKELMERSDALE GAS-WORKS.

CONTRACT No. 2.

THE Skelmersdale Local Board are prepared to receive TENDERS for the supplying, erecting, and fitting of GASHOLDER and Cast-Iron TANK, Plant and Apparatus, Pipe Connexions and Valves, Iron Roof, &c., and the various matters more particularly set forth in the drawings and specification, and the works in connexion therewith.

Copy of bill of quantities, form of tender, &c., and all information, may be obtained (on payment of two guineas, which will be returned on receipt of a *bonâ fide* tender) on application to Messrs. Goodison, Atkinson, and Forde, Engineers to the Board, Orange Court, Castle Street, Liverpool.

Sealed and endorsed tenders to be sent to the Clerk's Office on or before the 12th day of March next.

The Board do not bind themselves to accept the lowest or any tender.

WILLIAM PARR, Solicitor, Clerk to the Board.

Ormskirk, near Liverpool.

BRITON FERRY LOCAL BOARD.

TO GAS CONTRACTORS, IRONFOUNDERS, AND OTHERS.

THE Briton Ferry Local Board are desirous of receiving separate TENDERS for the erection and carrying out of the following works:—

1. A Cast-Iron Tank.
2. A New Retort.
3. Extension of Retort-House.
4. 60 Cast-Iron Lamp-Posts, Frames, and Lamps.
5. Laying Mains to Giant's Grave.
6. Laying Mains at Briton Ferry.

Sealed tenders to be sent in to me on or before Monday, the 5th day of March, 1877.

Plans and specifications, and particulars of the works, to seen at the Board Room at the above Works, Briton Ferry, on application to the Manager, Mr. Hoard, who will supply every information.

The Board do not bind themselves to accept the lowest or any tender.

By order,
JAMES KEMPTHORNE, Clerk.

Dyffryn Chambers, Neath, Feb. 21, 1877.

TENDERS FOR GAS COALS.

THE Directors of the Canterbury Gas and Water Company invite TENDERS for the supply of 6500 tons of best GAS COALS, to be delivered as follows:—

	Tons.		Tons.
April, 1877 . .	500	October, 1877 . .	600
May, ,, . .	500	November, ,, . .	700
June, ,, . .	800	December, ,, . .	700
July, ,, . .	800	January, 1878 . .	600
August, ,, . .	800	February, ,, . .	500

Persons tendering to state the name, and guarantee the description, of the Coal proposed to be supplied, and the price per ton, either free on board or delivered at the contractor's sole expense into the Company's coal stores, the weight in the latter case to be ascertained on the Company's weigh-bridge, and paid for accordingly.

Tenders, endorsed "Tender for Gas Coal," to be addressed to me, and delivered at the Company's offices, Castle Street, Canterbury, before Ten o'clock in the forenoon of Friday, the 9th of March next.

The Directors do not bind themselves to accept the lowest or any tender.

By order,
JAMES BURCH, Secretary.

Canterbury, Feb. 16, 1877.

T. NEWBIGGING,

CONSULTING GAS ENGINEER,

5, NORFOLK STREET, MANCHESTER.

HENRY LYON,

ENGINEER,
AND
CONSULTING GAS ENGINEER,
BROOKLYN, CHEETHAM HILL ROAD,
MANCHESTER.

ALFRED LASS,

SPECIAL ACCOUNTANT FOR GAS COMPANIES,
30, GRACECHURCH STREET, LONDON.

Accounts analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.

The Forms of Account, which have been specially designed by A. L. to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, and have been universally approved.

The above forms are registered.

Water Companies Accounts also prepared and adjusted.

CONSULTATIONS.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

JOHN ROMANS, C.E., F.G.S.E.,

CONSULTING GAS ENGINEER
AND
CANNEL COAL FACTOR,
30, St. Andrew Square, EDINBURGH.

Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.

GAS-WORKS TAKEN ON LEASE.

MR. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

ANALYSIS AND PRICES FORWARDED ON APPLICATION.

TO MANUFACTURERS
OF
GAS-ENGINES,
AND
APPARATUS FOR COOKING & HEATING BY GAS.

The Directors of the South Shields Gas Company are desirous of drawing the attention of their Consumers to the economy and advantages of Coal Gas for other purposes than that of Illumination—to Boiling, Stewing, Baking, Roasting, and all purposes of Cooking; for Heating Halls, Staircases, and Apartments; for Laundry purposes, Drying and Airing Clothes, and Ironing; for Heating Baths; for Trade purposes; and for producing Motive Power.

To further this object, the Directors invite the co-operation of manufacturers of apparatus for such purposes. It is proposed to have

A PUBLIC EXHIBITION

On the 9th, 10th, and 11th of APRIL next,
IN THE
FREE LIBRARY HALL OF THE BOROUGH;

to have the apparatus tested, to put some of it in action during the exhibition, and to award a silver medal to each of the successful competitors in the following classes:—

1. The most efficient and durable of cheap Portable Stoves for Boiling, Frying, and Grilling, suitable for a mechanic's home.
2. The most complete Family Gas Cooking Stove.
3. The best Gas Bath, Consumption of Gas, Expedition of Heating, and Price being observed.
4. The most simple Closed Apparatus for Heating Halls or Conservatories, either by Hot Air or Water.
5. The most cheerful Open Gas Fire with the least Consumption of Gas.
6. The cheapest efficient Gas-Engine.

Manufacturers may compete in all the classes, but not more than two prizes will be awarded to one manufacturer.

The award will be made by a Committee of three competent persons appointed by the Company.

The space being limited, though 80 feet by 40 feet, the Committee reserve the right of selecting or rejecting apparatus offered for exhibition. All apparatus must be delivered and removed free of cost to the Company, who will not be held responsible for any loss or breakage, though every care will be taken of the same by the Company's servants, who will arrange, fix, and work the apparatus unless otherwise desired.

Any suggestions for promoting the success of this movement will receive the attention of the Company's Engineer, to whom all communications are to be addressed.

W. J. WARNER, Engineer.

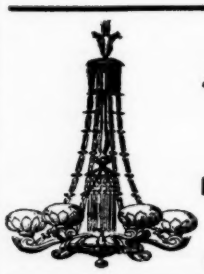
Gas-Works, South Shields, Feb. 15, 1877.

JOHN HALL AND CO., STOURBRIDGE,

Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.



F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

BROAD STREET, BIRMINGHAM.

ESTABLISHED 1807.

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

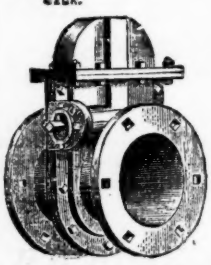
B. DONKIN & CO.'S

IMPROVED GAS-VALVES

WITH WROUGHT-IRON PINIONS.

List of prices, with full dimensions of all sizes up to 48-inch, to be had on application.

These Valves are proved on both sides to 30 lbs. on the square inch before leaving the works, and are kept in stock.



ALSO MAKERS OF

J. BEALE'S NEW PATENT GAS EXHAUSTERS,
STEAM ENGINES FOR DRIVING GAS EXHAUSTERS,
VALVES FOR AMMONIACAL LIQUOR,
IMPROVED BRIDGE VALVES FOR REGULATING THE SEAL IN HYDRAULIC MAINS,
BYE-PASS VALVES, &c., &c.

B. DONKIN & CO., 55a, BLUE ANCHOR ROAD, BERMONDSEY, LONDON, S.E.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

35A, GREAT GEORGE STREET,

WESTMINSTER, S.W.

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES.

FUEL-MACHINE, for Compressing Breeze and Tar.

WASHERS, SCRUBBERS, and PURIFIERS, that Economize Space and Cost.

N.B.—Pamphlet, with Eighteen Illustrations of the foregoing, with letterpress on the construction of Gas-Works, post free, 2s. 6d.

J. T. B. PORTER & CO.,

GAS ENGINEERS & MANUFACTURERS,

IRONFOUNDERS AND CONTRACTORS,

GOWTS BRIDGE WORKS,

LINCOLN.

ESTIMATES FOR GAS-WORKS OF ANY SIZE.

REFERENCES TO 500 WORKS ALREADY ERECTED.

N.B.—It is most particularly requested that all Communications be addressed to the FIRM ONLY, as circumstances have arisen which render this necessary.

S. OWENS & CO.,

WHITEFRIARS STREET, LONDON, E.C.,

HYDRAULIC ENGINEERS,

AND MANUFACTURERS OF

PUMPING MACHINERY of every Description.

SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF

BLAKE'S PATENT STEAM-PUMPS,

More than 10,000 in use,

ESPECIALLY ADAPTED FOR USE IN GAS AND CHEMICAL WORKS, FOR PUMPING TAR, WATER, AMMONIACAL LIQUOR, ACIDS, &c.

The following are some of the prominent advantages of the BLAKE PUMP:—

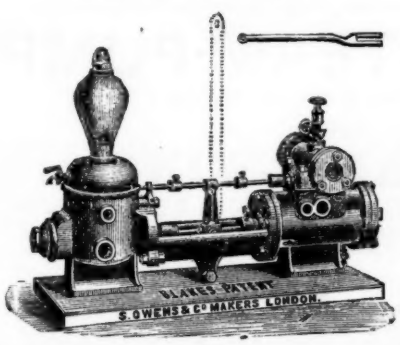
It will start at any point of stroke.

It has no dead point.

It works fast or slow, with the same certainty of action.

It is economical. Has a lead on the slide-valve.

It is compact and durable.



It is interchangeable in all its working parts.

It will deliver more water than any other pump.

It is made of best materials in the most workmanlike manner.

Can be worked at 20 strokes per hour, or 200 strokes per minute.

This Illustration represents Boiler-Feed Pumps, Sizes Nos. 1, 2, and 3, with Hand Lever for working Pump when Steam is not available.

SOLE MANUFACTURERS OF

MANN & OWENS

IMPROVED PATENT GAS-VALVES.

PRICED LISTS AND FULL PARTICULARS FURNISHED ON APPLICATION.

CATHELS'S Patent District Dry Gas-GOVERNOR is the only perfect self-acting contrivance for Regulating the Pressures in the higher levels of a district.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, ROTHERHAM.

CATHELS & TERRACE'S Patent Four-WAY DISC GAS-VALVE is the simplest and best Valve for Purifiers, and as a By-pass for other apparatus in Gas-Works. It is always gas-tight, and has no springs, ground faces, or other delicate parts. By its use the flow of the gas cannot be accidentally stopped, and it never sticks.

For prices, &c., apply to the Manufacturers, Messrs. GUEST AND CHRIMES, Foundry and Brass Works, ROTHERHAM.

CATHELS'S IMPROVED

RETORT-SETTINGS.

GUARANTEED TO HEAT UNIFORMLY WITH THE MINIMUM OF FUEL.

Coloured Lithograph copies of Working Drawings of Beds of 1, 2, 3, 5, 6, and 7 Retorts each, so clearly arranged and fully shown as to be easily understood by any retort-setter or bricklayer, having just been made of these valuable Settings, they can now be supplied with detailed specifications, immediately on receipt of orders.

Applications to be made to Mr. THOS. NEWBIGGING, Gas and Consulting Engineer, 5, Norfolk Street, MANCHESTER.

THE Vale of Neath Dinas Fire-Brick and Cement Company, Limited, Pontwalby Works, Glyn Neath, South Wales. Manufacturers of the Celebrated Genuine Dinas Fire-Bricks and Cement for Siemens's Regenerative Gas Furnaces, Bessemer Converters, Copper Smelting, Roofs of Puddling Furnaces, Glass-Works, Gas-Works, Coke Ovens, and processes involving intense and long-continued heat. Prices and estimates on application.

London Agency, 11, Queen Victoria Street, City.

BAILEY'S Patented Inventions are now in extensive use wherever steam is known. Bailey's Patent Steam Gauges, Pyrometers, Water Gauge Cocks, Test Pumps, Fusible Plugs, Steam and Water Valves, Safety Valves, Junction Valves, Pumps, Tell-Tales, Recorders, Lightning Conductors, Electric Telegraphs, Turret Clocks, Steam Joint Cement, Lifting Jacks, Boiler Feeders, Lime Catcher and Separator, Injectors and Ejectors, and every description of first-class Brass Work for Engines and Boilers. Gas-Works Managers who have not our large book should send for it.

16th edition, 1000 engravings, 4to., post free 3s. 6d. in stamps. weight 10 oz., cost of production £1000,

BAILEY'S Illustrated Inventions, con-taining details and prices of goods in our five several departments:—(1) Brass Foundry, Steam Gauges, Indicators, Feeders, and Fittings; (2) Engineers Sundries, Small Tools, and Stores; (3) Machine Pump and Fire Engine; (4) Turret Clock, &c.; (5) Electric Telegraph, A B C Instruments, Bells, and Apparatus.

W. H. BAILEY and Co., Albion Works, Salford, LANCASHIRE.

HEBBURN MAIN GAS COALS.

T. Stone, Esq., of Weymouth, writes on Nov. 17, 1876: "I have used about 12,000 tons of this Coal, with, I think, the best possible results, although not always under the most favourable circumstances. My Coal account made up to Midsummer last showed a makeage of 10,524 cubic feet per ton of 14¼-candle gas, and not a hundredweight of Cannel used. This statement would, I know, be incredible to many men, and may provoke the remark, 'How much of it is paid for?' For the gratification of such, I have to say that, of the above quantity, 9866 cubic feet per ton of Coal carbonized were brought to charge and duly paid for, with the exception of about 6s. per cent. for bad debts. The coke is of excellent quality. The above facts I hold to be a greater recommendation to your Coal than any words of mine could be."

THE TYNE COAL COMPANY, LIMITED, OWNERS.

W. RICHARDSON, Fitter,

29, QUAYSIDE, NEWCASTLE-ON-TYNE.

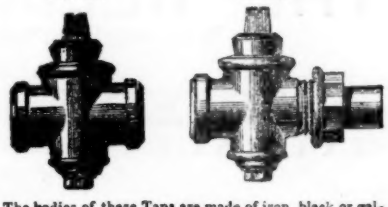
LAMBERT'S

CAST-IRON GAS-MAIN COCKS,

WITH PATENT WHITE METAL PLUGS.

TRADE (L) MARK.

No. 758. No. 759.



The bodies of these Taps are made of iron, black or galvanized, and the plugs of patent metal. They are warranted not to set fast or corrode, as do Iron or Brass Cocks; will always work easily; are strong, well made, durable; of little or no intrinsic value, and therefore not likely to be stolen; and the prices as stated below are (especially upon the larger sizes) fully 50 per cent. less than Brass Cocks.

	½	¾	1	1¼	1½	2-inch.
No. 758, with inside screws for iron pipe, black	2/0	3/0	4/4	6/6	7/6	12/0 each.
No. 759, with union on one end screwed inside for iron pipe, black	2/9	3/10	5/4	8/0	9/0	15/6 each.
Nos. 758 and 759, galvanized	0/3	0/4	0/6	0/8	0/10	1/4 extra.

MANUFACTORY:

SHORT STREET, LAMBETH, LONDON.

ARBITRATIONS, VALUATIONS, ASSESSMENTS AND PARLIAMENTARY APPLICATIONS CONDUCTED

ROBT. DEMPSTER & SONS,

GAS ENGINEERS AND CONTRACTORS,

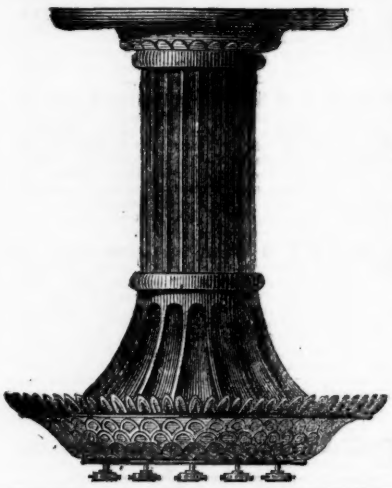
ROSE MOUNT IRON-WORKS, ELLAND, near HALIFAX, YORKSHIRE.

(Please address Letters vid Normanton.)

Entirely devoted to the Manufacture of Gas Apparatus at the above enlarged and commodious premises.

Estimates given for Works of any magnitude, or for the alteration and extension of existing Gas-Works, and for the supply of any Apparatus or Plant required thereon.

Drawings, Specifications, and Copies of Illustrated Catalogue on application.



HENRY GREENE & SON,

GAS AND HOT WATER ENGINEERS,

155, CANNON STREET, E.C.

Manufactory: 19 & 20, NICHOLAS LANE, E.C.

SUN-BURNERS,

With Regulating Valves to obviate down draught.

MEDIÆVAL & OTHER GAS-FITTINGS

For Churches and Domestic Use.

ARCHITECTS' OWN DESIGNS WORKED OUT.

ESTIMATES FREE OF CHARGE.

THE TRADE SUPPLIED.

SOLE CONSIGNEES FOR BRÖNNER'S IMPROVEMENTS IN GAS LIGHTING.

IN THE MATTER OF

BRÖNNER'S GAS-BURNERS.

HENRY GREENE AND SON, 155, Cannon Street, London, Sole Agents for Great Britain, Ireland, and Colonies, of Brönner's Improvements in Gas Lighting, beg to inform the public that on the 13th of January, 1876, Julius Brönner obtained an injunction in the Court of Session, Scotland, against Donald M'Vean, Gas-Fitter, 14, Newton Street, Glasgow, prohibiting him from in any way advertising or offering for sale as Brönner's Burners, any Burner not manufactured by Julius Brönner, or from in any way inducing the public to believe that the said Donald M'Vean sells or keeps for sale Brönner's Burners, manufactured by Julius Brönner, while such is not the case.

Also that on the 9th of November, 1875, he obtained injunction in the same Court, and in the same terms, against R. M. Brechin and Co., 46, North Hanover Street, Edinburgh.

Also that on the 20th of April, 1875, in a suit in Chancery, before Vice-Chancellor Malins, number 1874, B 365, he obtained injunction against another defendant, in the same terms and on similar grounds.

WEST'S GAS IMPROVEMENT COMPANY,

LIMITED,

ARE NOW PREPARED TO SUPPLY AND ERECT THEIR PATENTED MACHINERY FOR

CHARGING AND DRAWING GAS-RETORTS,

And to enter into arrangements with GAS COMPANIES for its use upon moderate terms of Royalty.

The Patented Machinery has secured the approbation of all Engineers who have visited the MAIDSTONE GAS-WORKS, *where it is in full operation, and may be inspected at any time on application to the Manager.*

The advantages attending its use are—

INCREASED VOLUME OF GAS PER TON.—INCREASED YIELD PER RETORT.—INCREASED BULK OF COKE FOR SALE.—REDUCTION IN LABOUR AND LESS DEPENDENCE ON SKILLED STOKERS.

A Pamphlet containing a description of the Machinery, and Copies of Reports on the working of the same, &c., will be forwarded on application to the MANAGING DIRECTOR, Maidstone. Communications may also be addressed to the Consulting Engineer, R. P. SPICE, Esq., M. Inst. C.E., 21, Parliament Street, London, S.W., or to the Engineer and Analyst, F. W. HARTLEY, Esq., A. Inst. C.E., 55, Millbank Street, London, S.W.

THE "RELIABLE" STEAM-PUMP

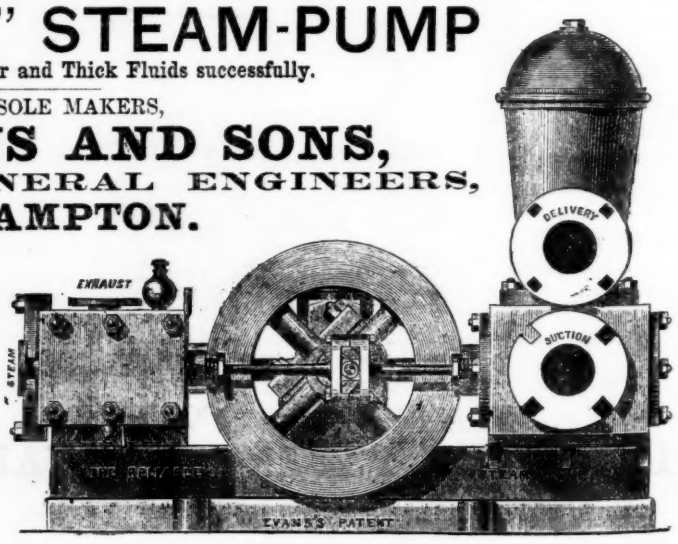
Is the only Pump that will Pump Tar and Thick Fluids successfully.

PATENTEES AND SOLE MAKERS,

JOSEPH EVANS AND SONS,

HYDRAULIC AND GENERAL ENGINEERS,

WOLVERHAMPTON.



THE "RELIABLE" PUMP

Has been adopted by the

BIRMINGHAM CORPORATION GAS-WORKS,

THE GAS-WORKS AT BLACKBURN,

LEEDS, CARLISLE, DUDLEY, WOLVERHAMPTON,

ETC., ETC.,

And also by the Principal

TAR DISTILLERS IN THE KINGDOM.

MAKERS AND PATENTEES OF PUMPS OF ALL KINDS.

CATALOGUES ON APPLICATION.

JOHN ABBOT AND CO.,

LIMITED,

IRON AND BRASS FOUNDERS,

PARK WORKS, GATESHEAD-ON-TYNE.

London Office: 2, SUFFOLK LANE, CANNON STREET.

Glasgow Office: 54, ST. ENOCH'S SQUARE.

MANUFACTURERS OF ALL DESCRIPTIONS OF

HYDRAULIC MACHINERY,

INCLUDING

ACCUMULATORS, FORCE-PUMPS, CRANES, & LIFTS,

FOR

GAS-WORKS, WAREHOUSES, &c.

IMPROVED HYDRAULIC MACHINERY,

Specially Arranged for Lifting and Lowering Purifier-Covers, &c.

MAKERS OF

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS;

PIPES FOR GAS AND WATER WORKS;

ROOFS, COLUMNS, AND GIRDERS.

DESIGNS AND ESTIMATES SUPPLIED ON APPLICATION.

THOMAS ALLAN & SONS,

IRONFOUNDERS,

WORKS:

SPRINGBANK FOUNDRY & NORTH WOODSIDE FOUNDRY,

GLASGOW;

BONLEA FOUNDRY, STOCKTON-ON-TEES,

Manufacturers of

CAST-IRON GAS AND WATER PIPES.

SIZES: ¾ to 12 inches at GLASGOW.

„ 1½ to 7 „ STOCKTON.

A LARGE STOCK KEPT, AND PRICES MODERATE.

Freight to London, in the Stream, 10s. per ton from Stockton; 12s. 6d. from Glasgow.

London Agent: Mr. A. C. FRASER, ST. STEPHEN'S CHAMBERS, TELEGRAPH STREET.

C. & W. WALKER,
8, FINSBURY CIRCUS,
LONDON, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

They are, in all cases, constructed under guarantees to perfectly perform their work. They are now extensively used in the largest gas-works of London and the chief cities of Europe, the number in use exceeds **one hundred,** and their perfect efficiency and profit to a gas company have been fully established with every variety of coal used in Europe. References can be given to the largest gas-works in Europe.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

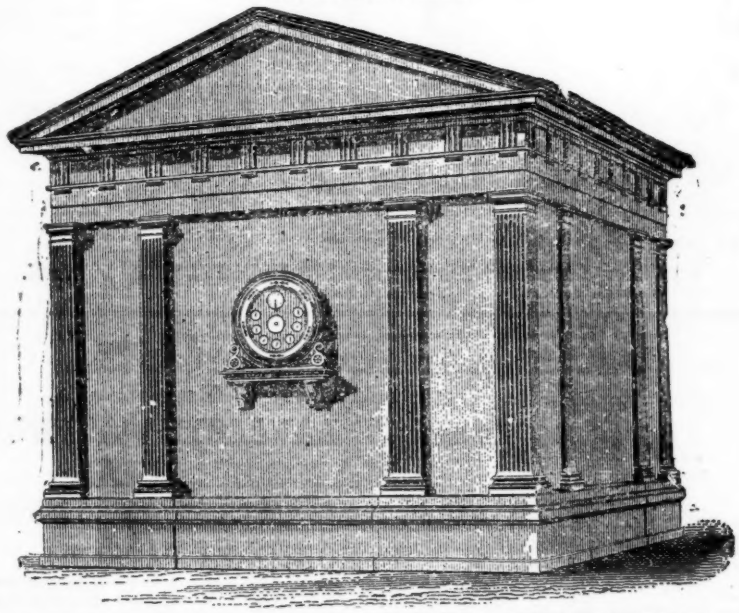
Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us. C. AND W. WALKER, 8, FINSBURY CIRCUS, LONDON, E.C., or to Mr. WILLIAM MANN, late Superintendent of the Chartered Gas-Works, BLACKFRIARS, LONDON; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

J. EDMUNDSON & CO.,
19, GREAT GEORGE STREET, WESTMINSTER,
LONDON, S.W.,
MANUFACTURERS OF EVERY DESCRIPTION OF
GAS APPARATUS.
CONTRACTORS FOR THE
ERECTION OF GAS-WORKS, GAS-FITTINGS, &c.,
FOR TOWNS, COUNTRY MANSIONS, &c.
Estimates given free of Charge.

J. & J. BRADDOCK,
GAS ENGINEERS,
GLOBE METER-WORKS, OLDHAM,
MANUFACTURERS OF
WET & DRY CONSUMERS GAS-METERS,
OF THE HIGHEST EXCELLENCE ONLY;
ALSO LICENSEES AND MANUFACTURERS OF
WARNER & COWAN'S PATENT SELF-REGULATING GAS-METERS;
ROUND STATION-METERS,
ON CAST-IRON STANDS.



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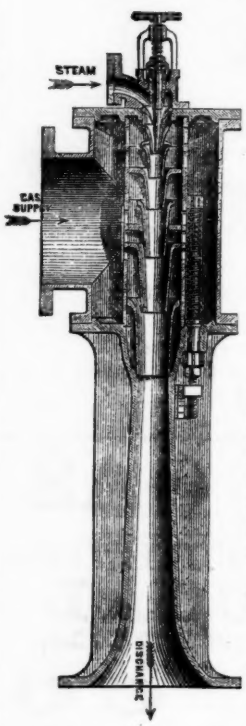

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Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—
(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.
Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.
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The object attained by this invention is the *correct measurement of Gas under every fluctuation of the pressure.*

Accuracy is obtained by subjecting the whole of the water which determines the measuring chambers of the drum to one uniform even pressure, and so prevents unequal displacements of the water-line.

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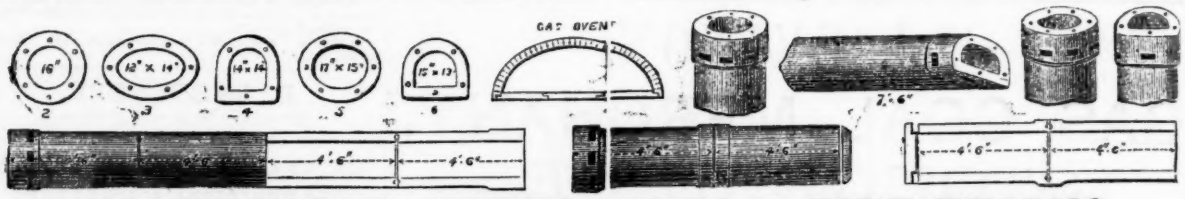

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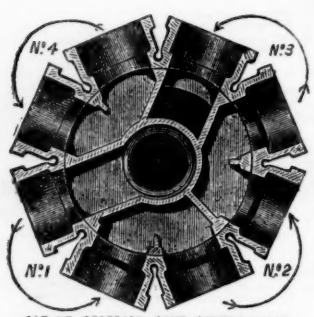

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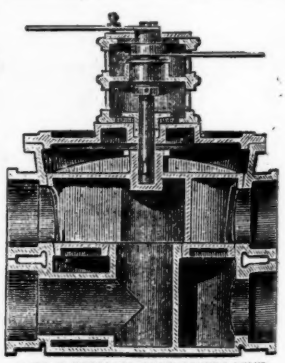

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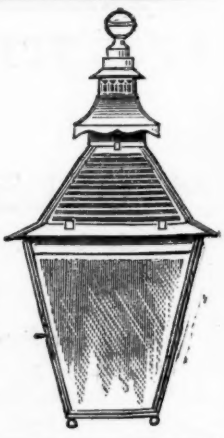

55 and 56, HIGH HOLBORN, LONDON.

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